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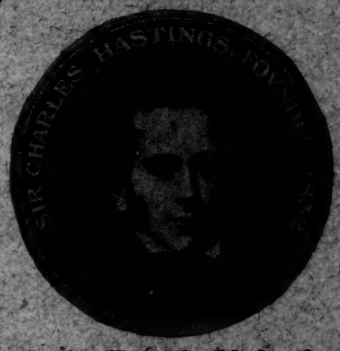

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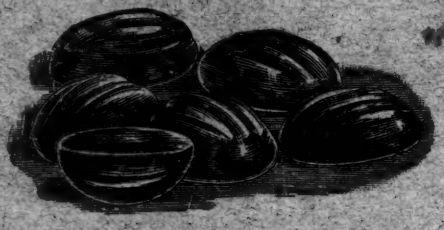
Efficient  *Palatable*

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PENETRATING WOUNDS OF THE ABDOMEN.

BY

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ASSISTANT SURGEON, ROYAL HOSPITAL FOR SICK CHILDREN, EDINBURGH;

AND

CAPTAIN H. T. BATES, B.A., M.B., Ch.B.Dubl., R.A.M.C.(T.),

BRITISH EXPEDITIONARY FORCE.

(Report to the Medical Research Committee.)

We have lately had an opportunity of observing the operative results of a number of cases of penetrating wounds of the abdomen. So much debate has centred around the treatment of these cases that we believe it may be of interest to record some of the observations which we have made.

PENETRATING ABDOMINAL WOUNDS CONSIDERED LOCALLY.

Wounds of Stomach.

We have had a total number of six cases, and they illustrate wounds of almost every possible portion of the stomach.

Morbid Anatomy.

The degree of damage which is sustained depends on two factors—the nature of the projectile, whether shell fragment, bullet, or bomb, and the part of the stomach which is injured. In regard to the first qualification, shell fragments produce almost invariably the most extensive destruction, for combined with the irregularity in their shape there is a high degree of velocity in the speed with which they strike the part. These facts are illustrated both by text and diagram in Case v. Bullets generally behave as they do in other soft tissues, that is with a small entrance wound and a larger wound of exit, but, as will be shown later, the amount of damage produced by a bullet is very closely related to that part of the viscus which is struck—for example, bullet wounds of the pylorus are more extensive than bullet wounds of the body of the stomach. Bomb wounds in their degree occupy a position which is midway between the shell and the bullet wound; the bomb fragment has the irregularity of the shell fragment, but its velocity is comparatively small. The region of the stomach which is injured is all-important, and these remarks apply to bullet wounds, as shell and bomb wounds do not appear to be so much influenced by position. Bullet wounds in the centre of the body of the stomach have a comparatively small entrance and a slightly larger exit wound. A bullet wound in the region of the pylorus has a relatively small entrance wound, but the exit wound is usually large and pouting. The greater degree of severity would appear to depend on the fact that the projectile passes through the thicker musculature in the neighbourhood of the pylorus (see Case vi).

Bullet wounds involving the greater or lesser curvature are always extensive; the lines of force are such that accompanying the actual wound there is extensive splitting and tearing of the musculature of the stomach wall (see Case v).

The haemorrhage is not severe unless the wound has actually involved one of the larger vessels (coronary or gastro-epiploic), and in this respect stomach wounds differ from wounds of small intestine.

There is usually haemorrhagic infiltration of the peritoneal and muscular coats, and it is important to notice that there are points of tissue separation and actual tissue necrosis for a considerable distance around the wound.

Clinical Features.

Wounds of the stomach demonstrate the clinical features which one associates with wounds of the hollow viscera of the abdomen generally—there is pain, sickness, collapse, rigidity of the abdominal wall, with tenderness on pressure; but, in addition to these general features, there are certain distinctive signs. Sickness is usually more pronounced than in wounds of the other abdominal viscera, and in the vomited matter it is rarely that one fails to find the presence of blood. The degree of collapse is less marked than that found in intestinal injuries, but, whether or not this is related to the comparatively smaller amount of haemorrhage one cannot say.

It is interesting to note that, while the pulse and respiration rates are both increased, the respiration-rate has proportionately increased more rapidly than the pulse-rate. The degree and the variety of the clinical features are influenced considerably by the situation of the lesion. Pain would appear to be more intense when the cardiac or pyloric ends of the stomach are involved; it is correspondingly less so when the wound is related to the body of the stomach.

Wounds of the curvatures of the stomach, with the greater destruction which invariably accompanies them, are associated with severe symptoms of collapse. The clinical features are also influenced by the condition of the stomach at the time of injury; if the stomach contains a quantity of food the wound is followed by more intense clinical features than if the organ had been empty.

Treatment.

These remarks are of course confined to operative treatment. If by examination we are confident that the stomach is injured, we have found it advisable to employ a left rectus incision, either splitting or retracting the muscle; this incision gives good approach to any part of the organ, occasionally it is necessary to enlarge it laterally. When the situation of the wound is doubtful we have used an incision parallel to the left costal margin. After exposure an examination is made of the anterior surface and lesser curvature of the stomach, and of the region of the cardiac orifice. The anterior layer of the great omentum is torn through, and the greater curvature and the posterior surface are thoroughly passed in review. We have met with conditions which called for three different lines of treatment, either singly or combined, the different lines of treatment being: (1) Simple suture (Cases i and ii); (2) gastro-enterostomy (Case v); (3) pylorectomy or resection of a portion of the stomach, usually combined with a gastro-enterostomy (Case vi).

In regard to simple suturing some situations are infinitely more difficult of access than others—for example, in a wound at the cardiac end of the stomach and near the lesser curvature we have experienced extreme difficulty in closing the opening. It has been our principle to excise the wound edges, thus preparing a more suitable surface for suturing and healing, afterwards closing the wound with a primary approximating and a secondary invaginating linen thread suture. Gastro-enterostomy is indicated when there is an extensive wound of the dependent part of the greater curvature of the stomach; the anastomosis may be done on the principle introduced by Kocher, but more usually the position and type of anastomosis will have to be modified by the existing conditions. Wounds of the pyloric end of the stomach are often so extensive that it is necessary to remove the damaged portion of stomach with closure of the open ends, and a secondary gastro-enterostomy.

If the peritoneal surface has been grossly soiled with stomach contents, we have washed out the cavity, draining it suprapubically with a Keith's drainage tube. In perforation of the posterior wall of the stomach with infection of the cavity of the lesser sac of the peritoneum we practise drainage of this space by a tube passed posteriorly above the pancreas.

Synopsis of Cases.

Case i.

Pte. B. H., West Riding Regiment. Wounded with a rifle bullet at 10.30 a.m.; he was admitted to hospital at 2 p.m., and was operated on within four hours of receiving the wound. The entrance and exit wounds were in the left epigastrium and left loin. There was pain complained of, and sickness containing blood-stained matter; there was the usual accompanying abdominal rigidity. The general condition was good, and there was no marked collapse. The abdomen was opened in the left rectus line; perforations were found through anterior and posterior walls of the body of the stomach; in addition, the jejunum was perforated just beyond the duodeno-jejunal flexure. The perforations were closed with sutures, and the usual drainage was established. The patient made an uninterrupted recovery, and was discharged to the base.

Case ii.

Pte. A. F. H., Royal Engineers, was wounded by a rifle bullet at 6.30 p.m. on August 28th, 1915, and admitted to

hospital at 11 a.m. August 29th. The entrance and exit wounds were in the left epigastrium and left loin; great abdominal pain was complained of, and the patient was practically pulseless. The abdominal cavity contained a quantity of blood, and there was an effusion of blood into the left pleural cavity. So complete was the collapse that operation was delayed for three hours, and during that period various restorative measures were carried out. When operation was performed access was gained to the abdominal cavity by an incision parallel to the left costal margin. The abdominal cavity was full of blood; there was a wound of the stomach where the lesser curvature joins the oesophagus, and from it stomach contents were escaping; the profuse haemorrhage had apparently originated from a branch of the coronary artery. With great difficulty the perforation was sutured; the peritoneal cavity was washed out, and drainage secured. The patient died about two hours after the completion of the operation. *Post-mortem* examination showed that in addition to the wound of the stomach the lower lobe of the left lung was perforated, while the pleural cavity contained a large quantity of blood.

CASE III.

Pte. B. W., King's Royal Rifles. Wounded at 7 p.m., September 11th, he was admitted to hospital at 10 p.m. of the same date. There were entrance and exit wounds in the left back and loin. There were the usual signs of injury to the abdominal viscera; there was a considerable degree of collapse, the pulse-rate on admission being 130. The abdomen was opened by an incision running parallel to the left costal margin. It was found that the projectile had grazed the left end of the greater curvature of the stomach; in addition there was a perforation of the splenic flexure of the colon. The perforations were closed with sutures and drainage established. On the sixth day a faecal fistula developed from the colon wound, but otherwise a good recovery was made.

FIG. 1 (to illustrate Case IV).—Bullet wound of the greater curvature of the stomach.

CASE IV.

Pte. H. W., Rifle Brigade, wounded at 10 p.m., August 29th, 1915. He was admitted to hospital at 2.30 a.m. of the following day. On admission it was found that the collapse was so intense that any operative procedure was entirely out of the question; he died a few hours after admission. *Post-mortem* examination showed that there was a large tear in the greater curvature of the stomach; in addition the bullet had passed through the left lung, and the pleural cavity contained a quantity of blood. This case was not operated on, but we have included it to show the greater degree of severity and collapse which follows wounds of the greater curvature of the stomach. The patient was admitted about four hours after sustaining his wound, but even at that early period he was entirely beyond operative aid.

CASE V.

Pte. G. H., Yorks and Lancs. There was a shell wound of the left hypochondriac region sustained at 8 a.m. of September 23rd, 1915; he was admitted to hospital at 4.30 p.m. of the same day. There were all the signs of injury to the abdominal viscera, and, in addition, it was obvious that the patient was bleeding profusely internally. The abdomen was opened through the left rectus; it contained a large amount of free blood mixed with gas. Along the greater curvature of the stomach there was a wound about two and a half inches long; the position of the wound was such that it permitted of a gastro-enterostomy being done between the open wound and the jejunum. The edges of the stomach wound were excised. In addition to the stomach wound there were seven perforations in a two and a half feet length of small intestine, necessitating resection and lateral anastomosis. The patient survived the operation for about eight hours and then died of collapse. The case demonstrates the suitability of a gastro-enterostomy under certain conditions.

FIG. 2.—Anterior view of the pylorus, showing the small entrance wound.

FIG. 3.—Posterior view of the pylorus, showing the large exit wound.

FIGS. 2 and 3 (to illustrate Case VI).

CASE VI.

Cpl. A. C., King's Royal Rifles. Wounded at 6 p.m., September 24th, 1915. He was admitted to hospital at 1.30 a.m. of the following day. On admission there were all the signs of injury to the abdominal viscera, but the collapse was too great to permit of immediate operation; operation was therefore delayed for two hours. Upon opening the abdomen it was found to contain a large quantity of blood, there was a perforation through the antrum pylori with a small entrance, and a large blown-out exit wound; in addition there were five perforations in the upper end of the jejunum. The damaged portion of stomach, the pylorus, and a portion of the body of the stomach, were removed, the open ends were closed, the damaged loop of intestine was resected, an anastomosis done, and a gastro-enterostomy performed between the body of the stomach and a loop of jejunum. This patient lived for twenty-four hours; during that period his pulse remained good and there was no sickness. He died eventually with extreme suddenness. This case illustrates the occasional necessity of removing a portion of the stomach.

Results of Stomach Cases.

Total cases, 6.	
Bullet wounds	5
Shell wounds	1
Suture	3
Gastro-enterostomy	1
Resection	1
Complicated with injured gut, etc.	6
Lived	2
Died	3
Unoperated on	1

WOUNDS OF SMALL INTESTINE.

Under this heading we have a total of twenty-one cases to consider.

Morbid Anatomy.

Among the series we have had cases of bomb, bullet, and shell wounds, and each of these varieties have distinctive features. Bomb fragments produce small and multiple wounds with slight evagination of the edges, but with a marked tendency to surrounding ecchymoses and haemorrhage (Cases XI and XXIII).

Bullet wounds, when caused by a projectile travelling at a great velocity and fired at a comparatively short range, are small perforations, with slightly larger exit than entrance wounds (Case XXII). Bullets travelling at a lower velocity result in considerable destruction of the gut wall.

When the projectile passes across the long axis of the gut it may pierce it through and through, but sometimes it tears it open as though it had been cut by a knife (Case XXIV). Bullets passing obliquely through or in the long axis of the gut produce extensive injuries; if in the long axis of the gut the bowel is torn completely open (Case XIII); if the intestine has been struck obliquely there are two large perforations, one on each side, with an intervening bridge of tissue (Case XIV).

The damage produced by shell fragments is usually very extensive (Case XII), but if the force of the fragment is nearly spent, our experience has been that the wound is no larger than the fragment which caused it—in one instance we have found the fragment of shell embedded in the gut wall (Case XVIII).

As regards position, wounds of the free edge of the gut are more extensive than those which occur at the mesenteric border. Correspondingly, wounds of fixed parts of the small intestine—for example, duodeno-jejunal flexure and the ileo-caecal junction—are less extensive than wounds of the freer portions of the gut.

Haemorrhage from small intestine is, as a rule, severe, especially when the wound has occurred in the jejunum. It is remarkable how rarely there is a massive escape of contents from the lumen of the gut—we have never seen it occur to any marked degree—apparently there is a complete inhibition of peristalsis for some time subsequent to the injury. Further, the less the damage to the gut and

the fewer the number of perforations, the more likelihood is there of extensive peritoneal soiling. We believe the converse holds good.

When the gut is injured it is rarely that the mesentery escapes, and one is exceedingly apt to overlook a wound in this region. When a large mesenteric vessel is cut the haemorrhage is rapidly fatal; but even in division of a comparatively small vessel or series of vessels the haemorrhage is progressive, a characteristic which is curiously peculiar to intra-abdominal bleeding. When the blood vessels in the mesentery are damaged, one is faced with the question whether the viability of the associated gut is or is not interfered with. In this relation we have observed that while interference with the mesenteric blood may not actually endanger the viability of the gut that portion of gut is particularly liable to a subsequent distension which may pass on to an actual paralysis.

FIG. 4 (to illustrate Case XXII).—Four feet of gut containing perforations from a machine gun bullet. The bullet has passed with a high velocity through various coils of gut, passing across the long axis of the gut. The resulting damage is not extensive.

There is nothing characteristic about the superficial wound. Unless one is prepared for it, one is at first apt to overlook the fact that bullet wounds of the buttock are liable to be followed by evidences of injury to the abdominal viscera.

Clinical Features.

The clinical features are those of commencing peritonitis coupled with the evidences of a rapid and progressive haemorrhage. The facial expression is one of intense distress, pallor may become evident and deepen. The pulse becomes progressively and rapidly quicker and weaker. General abdominal pain is complained of, the pain being accentuated at intervals. There is frequently retention of urine. Sickness comes on, and during the attacks of vomiting the abdominal pain is intensified. The temperature at first falls, and after some hours begins to rise. As a rule there is fixation of the abdominal wall, and the respirations are largely thoracic in type. Palpation elicits general tenderness, and palpation confirms the muscular rigidity which exists. Under the influence of morphine, and sometimes when the intra-abdominal bleeding is profuse, we have seen the muscular rigidity of the abdominal wall almost disappear. By percussion it is frequently possible to demonstrate the presence of dullness in the flanks and the diminution of liver dullness.

In later and untreated cases the clinical features are those of acute general peritonitis.

Treatment.

Later there are described measures which we have carried out preliminary to all abdominal operations for this class of case—measures which are intended to antagonize the shock and loss of blood which occurs. As a preliminary to operating for perforating wounds of the small intestine these precautionary methods are of the highest practical importance, as the amount of shock and the loss of blood in these cases are often exceptionally severe.

To open the abdominal cavity we have almost invariably used a middle-line incision; it is important that there should be no hesitation in making the incision one of considerable length. In localizing the sites of injury we have followed a well-defined routine. After opening the abdomen the caecum is identified, and from it the small intestine is traced upwards, beginning with the lower end of the ileum. As each perforation of the gut is exposed it is wrapped up in a small moist swab; to one side of the swab a length of tape is stitched; this is slipped through the mesentery and doubled twice round the gut covered by the swab; in this way each perforation is marked and at the same time there is less chance of a massive infection from the injured part. The whole length of the small intestine must be examined before any decision as to treatment is arrived at; there is nothing more disconcerting than to deal with a perforation by resection and to find that a few inches further on there is another perforation which could have been included in the same procedure. When the degree of damage to the gut has been brought under review there are three varieties of operative treatment which may be followed; these are: (1) Simple suture of the perforations; (2) resection of the damaged intestine, followed by a lateral or end-to-end anastomosis; (3) resection of the damaged intestine, with an accompaniment of a temporary enterostomy.

1. *Simple Suture of the Perforations.*

In the series of cases which came under our notice a small minority proved suitable to be dealt with by simple suture. In order to be suitable it is essential that the wound is small, without damaged edges and with an intact mesentery. Bomb fragments cause wounds which are most ideally suitable for suture.

The method has the obvious advantages of speed and simplicity of technique. There are certain distinct disadvantages: the suture may result in considerable narrowing of the gut lumen, and when there are a number of similar sutures within a short distance of each other the multiple narrowing becomes a very real objection. The second objection is that a suture, unless very complete, is apt to be followed by a local sloughing of the part. The edges of the perforation are devitalized and the microscope has shown that actual necrotic changes can be distinguished in the tissues for some distance around the wound.

FIG. 5 (to illustrate Case XXII).—This illustration demonstrates the pouting appearance of the mucous membrane at the point of exit.

In the suture operations which we have done we have not excised the wound edges and we have used linen thread as the medium for stitching (Cases VII, VIII, IX, X, and XI).

2. *Resection of the Damaged Intestine followed by Lateral or End-to-end Anastomosis.*

There are certain indications which necessitate this method of treatment: multiplicity of the perforation, extent of the degree of the perforation, and involvement of the related mesentery. We have distinctly favoured this method of treatment and we have preferred it at times when another method might have been chosen. Two disadvantages have been quoted—the complexity of the technique and the time which the operation entails. In regard to the second objection, we question if it takes any longer to complete a resection and anastomosis of gut than to do a multiple suture operation. The advantages are very great: the operation is a complete and a thorough one, the risk of damage following a mesenteric involvement is minimized; there are not the possibilities of local areas of sloughing as are so apt to occur in suture operations, and there is less possibility of subsequent stricture. Having weighed the choice of the operation, the question next

arises whether the anastomosis is to be a lateral or an end-to-end one. When we began this work we favoured and used an end-to-end anastomosis, on the ground that it could be accomplished in a shorter period of time than the lateral anastomosis. We discovered that this method was apt to be followed by a certain degree of paresis in the proximal segment with subsequent distension and eventual obstruction. On one occasion we had to perform a second short-circuiting operation to overcome the obstruction (Case XIII).

FIG. 6 (to illustrate Case XIII).—Eighteen inches of gut injured by rifle bullet. A portion of the lumen of the gut is torn widely open where the bullet has passed in the long axis of the intestine. The arrows illustrate the course of the bullet.

The gut appears to be predisposed to the distension from various causes: the general degree of nerve shock and more especially of sympathetic nerve shock; the paresis of Auerbach's plexus as a result of the blow; the presence of blood in the peritoneal cavity, and the degree of peritonitis which invariably is present. As a result of this disadvantage we began to employ a lateral anastomosis, and from it we have had undoubtedly greater satisfaction and better results. In point of time the lateral anastomosis takes a few moments longer in so far as it involves closing the open ends of the gut, but it apparently largely overcomes the possibility of distension of the proximal segment. We do not intend to enter into any details of the operation beyond mentioning that when the resected gut involves the extreme lower end of the ileum we have anastomosed the proximal bowel to the centre of the transverse colon. Short-circuiting, so to speak, by a unilateral short circuit the caecum, ascending colon and hepatic flexure, there are obvious mechanical advantages related to this method (Case XIV).

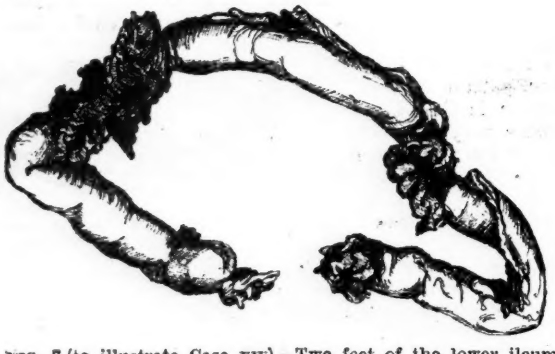

FIG. 7 (to illustrate Case XIV).—Two feet of the lower ileum injured by rifle bullet. Two portions of the gut have been entirely destroyed by the projectile.

3. *Resection of the Damaged Intestine with the Accompaniment of a Temporary Enterostomy.*

Fortunately we have only had occasion to have recourse to this most unsatisfactory procedure in one instance (Case XXV). It is justified when rapidly developing collapse necessitates that the operation be finished as quickly as possible; the damaged bowel is cut away and the open ends are sutured to the skin wound.

When there is gross soiling of the peritoneal cavity we have washed out the abdominal cavity with hot saline solution, draining subsequently suprapubically with a glass Keith's tube.

Synopsis of Illustrative Cases.

CASE VII.

Pte. B. T., Middlesex. There was an entrance wound in the left umbilical region; there was no exit wound apparent. There were signs of injury to the abdominal viscera, but the general condition was good. From the wound a coil of small intestine was prolapsed. At the operation the wound was enlarged; two perforations were found in the lower end of the ileum; the perforations were closed with purse-string and inverting sutures. Beyond a subsequent slight infection of the retroperitoneal tissues, which required drainage, the patient made a good recovery.

CASE VIII.

Pte. B. H., West Riding Regiment. Entrance and exit wounds were sustained by a bullet received four hours before admission; the general condition was good. Operation revealed two perforations of the jejunum just beyond the duodeno-jejunal flexure. These were closed with purse-string and invagination sutures. This case in addition showed two perforations of the stomach. Drainage was secured. The patient made a good recovery.

FIG. 8 (to illustrate Case XXIV).—The gut has been divided almost entirely across in four different places. All these injuries have been caused by a single rifle bullet. The round worm shown *in situ* was divided by the bullet.

CASE IX.

Pte. P. H., Northumberlands. This patient was wounded on the 26th of the month, but owing to military exigencies it was the evening of the 29th before he was admitted for operation; there was then an entrance wound below the umbilicus, together with all the evidences of extensive general peritonitis. It was doubtful whether operation was advisable, but it was decided to attempt it. A single perforation was found in the lower end of the ileum; this was sutured and drainage was secured. Subsequent to the operation the patient improved considerably; he apparently was on the road to recovery, the bowels moving well, when, a week after the operation, he died suddenly from what apparently was heart failure.

FIG. 9 (to illustrate Case XVIII).—A length of jejunum removed for injury by a fragment of shell. The intestine showed six perforations, and a fragment of shell was found embedded in the wall of the gut. S, Shell fragment.

CASE X.

Pte. T. S., East Lancs. There were entrance and exit wounds, the bullet having entered the right buttock and come out anteriorly below the umbilicus. There were the usual evidences of injury to the abdominal viscera, and the general condition was fair. Operation showed a single perforation in the upper end of the ileum; there was extensive soiling of the peritoneal cavity and a commencing general peritonitis. The perforation was closed by suture. Four days after operation the patient succumbed to the general peritonitis which was present.

CASE XI.

Pte. A. H., Black Watch. This man was wounded by a bomb explosion, and there were a number of entrance wounds in the left flank. There was intense shock, the pulse being 150. A number of fragments had entered the abdominal cavity and there were all the signs of injury to viscera. In addition two fragments had entered the left lung and a third entered the spinal cord, producing complete paraplegia below the eighth dorsal segment. After waiting some hours for a possible improvement operation was carried out The abdomen contained a large amount of blood. There were four perforations

in the jejunum about 8 in. below the duodeno-jejunal flexure; each was closed with suture. In addition the transverse colon was perforated at its centre; in the descending colon there were six through-and-through perforations; these wounds were sutured. The abdomen was washed out and drained suprapubically and in the left flank. As far as the abdominal condition is concerned, we believe we are justified in looking on this case as a success; his eventual history, however, shows that he ultimately died of a gradual ascending spinal meningitis secondary to the infected wound of the spinal column.

The above cases are illustrative of the suture operation.

CASE XII.

Pte. G. H., Yorks and Lancs. In this case the injuries were the result of a shell wound. There was intense collapse. The abdominal cavity was filled with blood; there were seven perforations in a two and a half feet length of small intestine (upper end of ileum); practically all of the perforations were very large wounds. Three feet of small intestine were removed and a lateral anastomosis completed. In addition, the stomach was extensively torn, necessitating a gastro-enterostomy. The patient survived for eight hours and died of collapse.

CASE XIII.

Pte. W. G., Seaforth Highlanders. On admission the patient was collapsed; there was progressive haemorrhage from both superficial wounds and general abdominal rigidity. The operation was performed under spinal anaesthesia. The deep epigastric artery of the left side was severed, hence the superficial bleeding; the abdominal cavity was full of blood. In the upper end of the ileum there were three perforations—two small and one exceedingly large—opening up the gut for about one and a half inches. Nine inches of gut were removed and an end-to-end anastomosis completed. Forty-eight hours later signs of obstruction developed and the abdomen was again opened under spinal anaesthesia; the proximal segment of gut at the anastomosis was distended, and there was a large effusion of blood into the mesentery of this portion of the gut. A lateral anastomosis was done, short-circuiting the end-to-end suture. The patient made an uninterrupted recovery; two months later we have heard from him as being in excellent health.

FIG. 10 (to illustrate Case XII).—Wounds of small intestine caused by a fragment of common shell. Note the very extensive degree of the injury in each case.

CASE XIV.

Pte. L. T., Black Watch. This man was wounded in the right buttock, and six hours after having received the wound he was admitted to hospital; there were all the signs of injury to abdominal viscera. The operation was done under spinal anaesthesia. When the abdomen was opened a perfect fountain of blood escaped; in the lower two feet of ileum there were six perforations—in two instances the gut was shattered to pieces. The damaged intestine was removed and a lateral anastomosis completed between the ileum and the centre of the transverse colon. The patient made an uninterrupted recovery, and three months later he informed us that he was enjoying excellent health.

CASE XV.

Cpl. A. C., King's Royal Rifles. Seven and a half hours elapsed since receipt of a bullet, which had passed through the abdomen from side to side. There was intense collapse, and operation was delayed for two hours. At operation there were found to be five large perforations in the upper part of the jejunum. In addition the transverse colon was torn across and the stomach was almost divided in two places. The damaged loop of small intestine was removed and a lateral anastomosis completed; the stomach wounds were repaired and a gastro-enterostomy done; the damaged colon was brought out, and a colostomy completed. The patient stood the operation remarkably well, and he survived for over twenty-four hours; during that time there was no sickness and his pulse remained good. He then suddenly collapsed and expired.

CASE XVI.

Pte. E. H., King's Royal Rifles. The wound had been sustained in the right loin, and the bullet had taken an oblique path, being embedded below the left costal margin. Fifteen hours had elapsed since receipt of the injury, and the collapse was intense. After waiting some time, and taking measures to overcome the collapse, it became obvious that there would be no improvement, and that the patient was bleeding rapidly internally. The abdomen was opened; 18 in. from the duodeno-jejunal flexure the gut was torn across in three places; there was profuse bleeding from a large branch of the mesenteric artery. The damaged gut was resected, and the bleeding arrested. The patient died thirty-six hours after operation. *Post-mortem* examination showed no other lesion, and death was due to haemorrhage and collapse.

CASE XVII.

Sergt. S. P., Worcesters. The entrance and exit wounds were in opposite flanks. There was complete collapse, seventeen hours having elapsed since the receipt of injury. There were all the evidences of general peritonitis, and the abdominal cavity contained a quantity of fluid. Operation was conducted under spinal anaesthesia. The peritoneal cavity was found to be full of blood. In 2½ feet of small intestine (lower end of jejunum) there were seven perforations, several of them tearing the gut entirely across. During the operation there was progressive bleeding from the retroperitoneal tissues; its source could not be found. After the operation the patient steadily sank, and died ten hours later.

CASE XVIII.

Pte. A. H., Lincolns. Shell wound. There were entrance and exit wounds in the right epigastrium and left flank. There were all the signs of injury to the abdominal viscera, but the degree of collapse was not marked. Operation revealed the abdomen to be full of blood and gas. Twelve inches of jejunum were extensively damaged by six perforations. In the wall of the gut the fragment of shell was embedded. The transverse colon was torn across at its centre. The damaged small intestine was removed, and a lateral anastomosis completed. The perforated transverse colon was converted into an efficient colostomy. The patient made an uninterrupted recovery.

CASE XIX.

Pte. H. B., Rifle Brigade. On admission this patient showed entrance and exit wounds from the right buttock to the left hypochondrium. There was profuse external haemorrhage. The man was practically pulseless, but he improved somewhat after the intravenous transfusion of saline. There were all the signs of a generalized peritonitis. Operation was conducted under spinal anaesthesia, but the patient succumbed before any operative procedure could be carried out. Subsequent investigation showed that there were ten wounds throughout the small intestine, nearly all of which had torn the gut entirely across. For a distance of 6 in. in one part the lumen of the gut was entirely destroyed. In addition, the iliac colon was divided and the internal pudic artery was severed as it lay in Alcock's canal.

CASE XX.

Pte. H. C., Wiltshire Regiment. The entrance and exit wounds were from side to side of the abdomen, and from the exit wound there was a considerable protrusion of omentum. On admission the general condition was good, but there were all the evidences of injury to the abdominal viscera. When the abdomen was opened the cavity was found to be filled with blood; there were seven perforations in the upper four feet of jejunum, and in two instances the gut was shattered to pieces. The damaged gut was removed, and as the proximal portion was too fixed to permit of a lateral anastomosis, an end-to-end suture was carried out. The patient died forty-eight hours after operation. *Post-mortem* examination revealed an intense peritonitis, especially in the upper part of the abdomen, and this apparently was the cause of death.

CASE XXI.

Cpl. B. A. E., Durham Light Infantry. There was an entrance wound in the left buttock; there were the signs of injury to the abdominal viscera, together with symptoms of intense collapse, pulse being 130. Ten hours had elapsed since the injury was received. The abdomen was opened in the middle line under spinal anasthesia. There was an immense effusion of blood. Three feet of the ileum was found to be extensively damaged and torn with eight perforations. The damaged gut was removed and a lateral anastomosis completed. The patient succumbed a few hours after operation.

CASE XXII.

Pte. R. J. W., Irish Guards. The patient was shot at close range by a machine-gun bullet. He was operated on within two

hours of receiving the injury, and his general condition was good; there were all the signs of injury to the abdominal viscera. Operation showed that the abdominal cavity contained a large quantity of blood. There were eight perforations in the lower end of the jejunum, and it was necessary to remove four feet of intestine. This was done and a lateral anastomosis completed. The ureter was also injured. The patient made a complete and uninterrupted recovery.

CASE XXIII.

Pte. McJ., Black Watch, was wounded in a bomb explosion, and there were at least five penetrating wounds of the abdomen. When admitted he was very collapsed, the pulse being 150. Operation was delayed for some time and then performed under ether anaesthesia. There was a great amount of effused blood. Tracing the small intestine, there were fourteen perforations in the lower end of the jejunum, and it was necessary to remove six feet of gut; a lateral anastomosis was completed. There were four perforations in the descending colon, and these were closed with suture; a single large perforation in the transverse colon was converted into a colostomy. The patient passed a comfortable night and was remarkably well throughout the following day. He died somewhat suddenly on the second morning after operation.

CASE XXIV.

Pte. C. R., Seaforth Highlanders. There was a single entrance wound in the left buttock. It was interesting to note that there was no rigidity on palpation, but pain was complained of. Collapse was so intense that immediate operation was impossible. After some hours there was a slight improvement and operation was then performed under ether. There was an enormous quantity of free blood in the peritoneal cavity. There were four large perforations of the lower end of the ileum, three of them tearing the gut completely across; in addition there were three extensive bruises of the gut and two tears in the mesentery, which were bleeding profusely. Eighteen inches of small intestine were removed. The iliac colon was so damaged that it was necessary to perform an inguinal colostomy. The patient died of shock eight hours after operation.

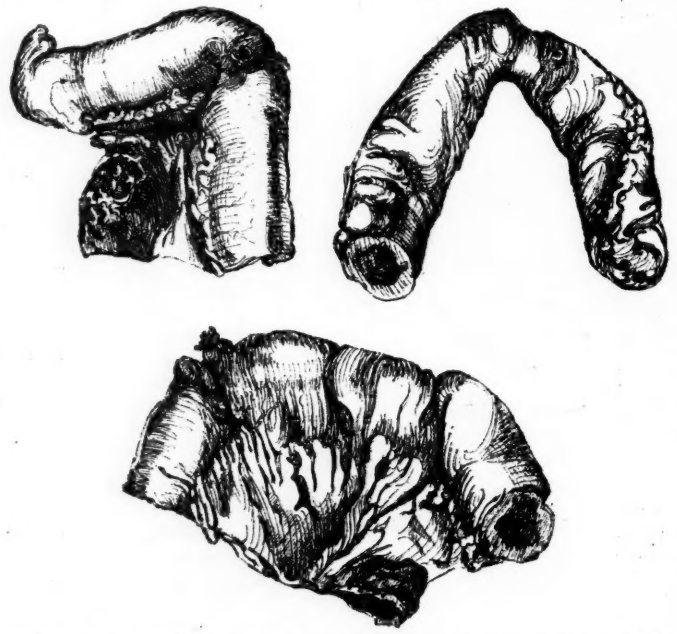

FIG. 11 (to illustrate Cases II and XXIII).—Bomb wounds of the small intestine. Note the comparatively small size of the wounds, the surrounding ecchymoses, and the suitability of such cases for suture.

The above cases are illustrative of the operation of resection and anastomosis of the intestine. In discussing the treatment of perforating wounds of the intestine we mentioned the possibility of having in some cases to do a resection of intestine, with the formation of a temporary enterostomy. It is an unsatisfactory operation, and fortunately we have had to resort to it in only one instance. That instance we now quote:

CASE XXV.

Pte. W. J., Black Watch. There was an entrance wound below the umbilicus, and there were evidences of injury to the abdominal viscera; in addition there was extreme collapse. On opening the abdomen there were found to be four perforations in the small intestine; in addition the rectum and the bladder were perforated. A suprapubic cystotomy and a colostomy were performed; there was no time to carry out an anastomosis of the gut, and the open ends of the intestine were stitched to the skin edges, after cutting away the damaged gut. The patient succumbed from shock a few hours after operation.

In conclusion we quote two cases the seriousness of whose general condition precluded any possibility of operative treatment:

CASE XXVI.

Pte. T. H., Cheshires. There was an entrance wound in the left buttock. The collapse was so intense that death ensued about one hour after admission. Examination showed eight perforations in the lower end of the ileum, two perforations in the lower end of the jejunum, and a complete severance of the iliac colon. There was a quantity of loose bone in the abdominal cavity.

CASE XXVII.

Sapper H. J., Royal Engineers. This man was wounded with shrapnel, and there was a large entrance wound in the left flank. When admitted the patient was pulseless and unconscious, and he died one and a half hours after admission. Examination showed eight perforations in the lower end of the ileum with extreme destruction of the gut.

Results of Small Intestine Cases.

Total cases, 21.	
Bullet wounds	17
Shell wounds	2
Bomb wounds	2
Suture	5
Resection	13
Enterostomy	1
Complicated cases	10
Recoveries	7*
Died	12
Unoperated	2

* One case eventually succumbed to an ascending spinal meningitis.

WOUNDS OF COLON.

We have a series of twelve cases to record, but several of these have been already mentioned in dealing with stomach and small intestine injuries. The general remarks one would make are very similar to those we have already mentioned in relation to small intestine, but there are several points which are more or less peculiar, and these will be dealt with.

Morbid Anatomy.

The effects of shell, bullet, or bomb vary exactly as they do in small intestine. Very similarly also the damage appears to vary according to whether the colon is fixed or free—for example, the transverse colon and the free loop of the iliac colon are frequently torn entirely across, while in the more fixed points simple perforation is the rule.

Effusion from a wound of the colon has a liability to be shut off and localized, more especially when the wound occurs in the ascending or the descending colon; it is quite common to meet with a collection of faecal and semi-purulent matter entirely shut off and opening into the underlying colon (Case XXVIII). It is, of course, an established fact that if the infection does not become localized, the peritonitis from a large intestine wound is intensely virulent.

Clinical Features.

The clinical features are very similar to those of small intestine injury. They are, primarily at least, not so widespread, and early sickness as a rule is absent.

Treatment.

We have drawn attention to the liability which colon wounds have of becoming localized, and this fact has a bearing on the operative treatment which one employs. The bearing is that if the patient comes under treatment at a period longer than twenty-four hours after the receipt of the injury it is a wise principle, primarily at least, to enlarge the original wound on the possibility that the infection is becoming localized. At an earlier period than twenty-four hours it is probably better to open the abdomen through a separate incision.

We have been impressed with the risk which one runs of overlooking injuries to the colon, and in one instance we have made this mistake (Case XXXV). The risk is greatest when the wound lies in one or other of the flexures of the gut.

The actual operative treatment may be summarized in two methods: (1) Simple suture; (2) simple suture with

colotomy. The operation of resection may be left out of account; it is rarely advisable to practise it in this type of surgery. We have favoured the use of a colotomy in combination with the operation of suture; there are the obvious advantages that it increases the safety of the suture, while it obviates the passage of faecal matter through the damaged gut.

In wounds of the ascending and the descending colon we have been impressed with the advisability of draining the retrocolic space by a tube passing into the loin.

CASE XXVIII.

Sergt. B. A. The wound had been sustained with a fragment of shell about twenty-four hours previously. His general condition was good, and local signs pointed to the fact that the injury and infection were limited to the neighbourhood of the wound. The original wound was opened up, exposing a small collection of faecal and semi-purulent matter; the containing cavity communicated with a wound in the ascending colon. The cavity was drained, and a faecal fistula developed. Recovery.

CASE XXIX.

Pte. B. W., King's Royal Rifles. The entrance and exit wounds were in the left loin; there were the signs of injury to the abdominal viscera, and a considerable degree of collapse. The abdomen was opened parallel to the left costal margin. There was a wound in the outer side of the splenic flexure of the colon; the wound was closed with suture and drainage established in the flank. A faecal fistula developed on the fourth day. Recovery. In this case the stomach also was injured.

CASE XXX.

Pte. O. H., Lincolns. This man was wounded with a fragment of shell. Opening the abdomen, in addition to wounds of the small intestine, it was found that the transverse colon was divided at its centre. The transverse colon was brought out, and so repaired that a single Paul's colotomy tube was fastened into the gut lumen at the site of injury; a length of small intestine was resected. Recovery.

CASE XXXI.

Rifleman P. F., Rifle Brigade. There were entrance and exit wounds in each loin respectively, with complete abdominal rigidity. The general condition was good. The abdomen was opened in the middle line. There was a large quantity of free blood in the peritoneal cavity. Two large perforations were found in the ascending colon; a local colotomy and repair was done. The bullet in its course had passed through the spinal column, but without damaging the spinal cord. He remained well until 6 a.m. of the following day; his pulse then suddenly failed, and he died an hour later. Death was apparently due to peritonitis and shock.

CASE XXXII.

Pte. S. J., North Staffords. The injuries were the result of shell wounds. There were three entrance wounds on the outer side of the hip. The patient was practically pulseless. Operation was delayed for two hours and restorative means were applied. Operation was finally carried out under spinal anaesthesia. There was a large perforation of the iliac colon immediately above the loop; at a higher level the posterior wall of the descending colon was torn. Repair and colotomy were done. Death from shock ensued twelve hours later.

CASE XXXIII.

Cpl. H. J., Royal Irish Rifles. A bullet wound had been sustained twenty-four hours previously. There was a much greater degree of collapse than seemed compatible with the injury. The entrance wound was enlarged; the iliac colon was perforated in two places; there was no evidence of injury to other viscera. Repair and colotomy were performed. Throughout the first and second days following operation the patient steadily improved; on the third morning he was exceedingly well, when suddenly about midday he developed an extensive secondary haemorrhage. At this point the case passed out of our hands, and we are unaware of his further history. (We have since heard that the patient died.)

CASE XXXIV.

Pte. T. H., North Lancs. There were entrance and exit wounds in opposite loins; the exit wound admitted two fingers. There were all the signs of injury to the abdominal viscera. On opening the abdominal cavity it was found to contain a large quantity of blood; there was a large wound of the postero-external surface of the hepatic flexure, and there was also an extensive tuberculous peritonitis. With difficulty the wound in the colon was sutured. The patient died nine hours later. *Post-mortem* examination showed the presence of a generalized tuberculosis.

CASE XXXV.

Pte. B. A., D.C.L.I. This patient was admitted suffering from a bayonet wound of the abdomen, the weapon having entered below the left costal margin. There were no evidences of abdominal infection, but the abdominal cavity was opened. No perforation was found, and there was neither free blood nor evidence of infection. The following day there was all the evidence of a general peritonitis; investigation showed that we had overlooked a small perforation below the splenic flexure. The patient later succumbed to the peritonitis.

This last case illustrates the liability of overlooking small wounds of the colon when they are situated in out of the way places, such as the hepatic and splenic flexures.

CASE XXXVI.

Pte. F. A., Worcesters. This patient was admitted suffering from a bullet wound of the left loin. Operation showed that the bullet had grazed the outer wall of the descending colon; it had not penetrated the mucous coat of the gut. The damage was repaired and local drainage was secured. On the second day after operation there was a suspicion of a faecal fistula, but this disappeared. The patient made a complete recovery.

CASE XXXVII.

Pte. M. H. W., R. W. Fusiliers. A fragment of common shell had passed through the left iliac fossa; the pelvis was fractured, and omentum was protruding from the wound. Operation showed that about one inch of the sigmoid flexure was entirely destroyed. A colotomy was performed and drainage secured. The patient made a good recovery.

Synopsis of Colon Cases.

Total cases, 12.*	
Bullet wounds	4
Shell wounds	5
Bomb wounds	2
Bayonet wound	1
Suture	6
Suture with colotomy	5
Complicated	4
Recovered	5
Died	6
Ultimate history untraced...	1†

* This total includes two cases of multiple perforation of the colon from bomb wounds; they were complicated with wounds of small intestine, and they have been dealt with under that heading.

† We have since learnt that this patient died.

WOUNDS OF SPLEEN.

In two cases damage to the spleen rendered it necessary to perform the operation of splenectomy.

Morbid Anatomy.

In one case a bullet was responsible for the damage; it had passed through one pole of the spleen, tearing it into two portions and splitting it in all directions. One portion of the spleen could not be recovered from the abdomen at operation; it appeared later from the wound as a small slough. In this instance the kidney was badly damaged (Case XXXVIII). The second case was of even greater interest than the first, because apparently the injury to the spleen was not a primary but a secondary result.

The bullet had passed comparatively superficially through the left flank, fracturing the lower ribs in its passage; the sharp fragments of ribs had been drawn inwards, and these fragments were responsible for the damage to the spleen. The movement of the spleen with each respiration had increased the damage until at the time of operation the organ was reduced to pulp. This is the second instance we have seen of this form of injury to the spleen; the first was not under our immediate care.

Clinical Features.

The first case was observed about six hours after the injury was sustained. The general condition was wonderfully good, pulse being only 88 per minute; there was some muscular rigidity along the left side of the abdomen; the abdominal cavity contained a quantity of free fluid; the temperature was normal. These, together with the entrance and exit wounds, were the only clinical evidences. The second case was different in so far as forty-eight hours had elapsed since the receipt of the injury; during that time haemorrhage had been continuous. When admitted the patient was pulseless, there were all the evidences of intense haemorrhage, the abdomen was distended, rigid, and contained a large amount of fluid.

Treatment.

In both cases we found it necessary to remove the damaged organ; the idea of suturing could not be entertained. We made use of an incision parallel to the costal margin, and no difficulty was encountered in removing the part. Drainage was secured in the flank and a Keith's tube was passed through a suprapubic opening into the pouch of Douglas. In the three cases which we have observed the injury to the spleen was complicated in two cases by damage to one of two other organs, the left kidney and the splenic flexures of the colon.

It is advisable that care be taken during operation that these complicating injuries be not overlooked.

Synopsis of Cases.

CASE XXXVIII.

Cpl. S. C., Royal Engineers. There was an entrance wound over the spinal column, and an exit wound in the left loin; there was left abdominal rigidity and evidence of internal haemorrhage. The abdominal cavity was opened; it was found to contain a large amount of blood. The spleen was shattered;

FIG. 12 (to illustrate Case XXXVIII).—Injury to spleen caused by rifle bullet. The lower portion was entirely detached and could not be recovered at operation; it was, however, recovered later.

its pedicle was ligatured, and the remains of the organ removed. The left kidney was so extensively damaged that its removal was also necessary. Uninterrupted recovery.

CASE XXXIX.

Pte. B. A., Grenadier Guards. This man was wounded forty-eight hours before admission in the lowest ribs at the posterior axillary line; the wound was produced by a rifle bullet. On admission the patient was pulseless, obviously suffering intensely from haemorrhage; the abdomen was distended and rigid. Upon opening the abdomen its cavity was found to be full of blood, the spleen was disorganized into a mass of bleeding pulp, the lower ribs were fractured, and their sharp ends had been driven into the spleen. The spleen was removed,

FIG. 13 (to illustrate Case XXXIX).—Injury to spleen caused by rifle bullet. It is probable that much of the resulting destruction was due to the viscus being torn by the indriven and fractured ribs.

and the sharp bone fragments excised. Drainage was established in the flank and suprapubically. The patient died on the seventh day after operation; he apparently succumbed from heart failure.

Results of Spleen Wounds.

Total cases, 2.	
Primary damage by bullet	1
Secondary damage by broken rib	1
Recoveries	1
Died	1

WOUNDS OF LIVER, GALL BLADDER, AND DUCTS.

In discussing wounds of this region we shall bring a series of fourteen cases under review, but it must be understood that only a relatively small proportion of these required operation.

Morbid Anatomy.

Our knowledge of the morbid anatomy of these cases is based entirely on operative experience; we have had no *post-mortem* experience.

The close relationship of the right pleura and lung to the right lobe of the liver is responsible for the fact that a wound of the liver is very frequently accompanied by damage to the overlying lung or pleura. This fact is important, as the latter condition is apt to be overlooked. We have seen a case in which the lung wound had been unnoticed until the degree of fluid in the right pleura actually endangered the patient's life. It would appear to be unusual to have much destruction or disruption of the liver tissue; probably for this reason the occurrence of a post-traumatic jaundice is uncommon. There is generally an escape of blood into the peritoneal cavity, and occasionally it can be demonstrated in the retroperitoneal tissues.

We have only one instance to record of a wound of the ducts—a case in which the cystic duct was divided close to its entry into the gall bladder. Duct wounds are so frequently accompanied by injury to large vessels that the result is generally fatal before they can be given surgical assistance.

Clinical Features.

The clinical features may be remarkably scanty. If the wound has involved the lung and pleura the pulmonary signs frequently disguise the abdominal features. Generally there is pain complained of over the liver and beneath the right scapula. The pulse, temperature, and more especially the respiration, are increased. There is usually some rigidity of the upper part of the abdominal wall; we have observed that the rigidity is increased and becomes more generalized when there is a considerable effusion of blood into the peritoneal cavity. By percussion an effusion can sometimes be demonstrated in the right iliac fossa. One would expect greater interference with the excretory function of the liver than is actually the case. On only one occasion have we seen a large effusion of bile into the peritoneal cavity (Case XLIV). Post-traumatic jaundice is exceptional, and when it occurs it generally indicates a septic change secondary to the wound. There is no alteration in the bile contents of the faeces, and the urine is free from bile.

Treatment.

We have only operated on such cases as showed progressive haemorrhage, or which, from the clinical features, we suspected to be complicated by wounds of other viscera.

In one instance we operated for a wound of the cystic duct (Case XL). In another instance a late operation was necessary on account of the accumulation of bile in the peritoneal cavity.

We have employed a Kocher's paracostal incision or the angled incision recommended by Mayo Robson; both incisions have given excellent access. The operation has generally been confined to investigation, plugging, and drainage.

Synopsis of Cases.

The following cases were operated on. It is unnecessary to give details regarding the cases which were unoperated on.

CASE XL.

Sergt.-Major P. W., Connaught Rangers. There was an entrance wound below the costal margin with an exit wound behind. There was general abdominal rigidity, an increasing area of dullness in the right flank, and evidences of general collapse. The abdomen was opened through an angled incision; it contained a quantity of blood and bile. The gall bladder was collapsed and the cystic duct was divided close to its entrance into the gall bladder. No other injury could be found beyond some scoring of the under surface of the liver. The divided duct was drained with a "dressed" rubber tube.

For two days there was a profuse discharge of bile; after that date it diminished and disappeared. Two months later the patient was in perfect health.

CASE XLI.

Pte. G. A., Royal Field Artillery. This man was wounded by a shrapnel bullet immediately above the right costal margin. His condition on admission was good, but some hours after admission signs of general peritonitis developed. The abdomen was opened; it contained a quantity of blood, and the upper surface of the liver was torn. The wound in the liver was drained with a dressed rubber tube. The patient made an excellent recovery.

CASE XLII.

Rifleman R. J., Rifle Brigade. There were entrance and exit wounds below the right costal margin and in the right loin, with general abdominal rigidity. The abdomen was opened and found to contain a quantity of blood. The under surface of the liver was torn and fissured. Drainage was secured with a dressed rubber tube. An uneventful recovery was made.

CASE XLIII.

Pte. J. J., King's Royal Rifles. There were entrance and exit wounds in the right axilla and over the right kidney; the entrance wound was small, but the exit wound was large and admitted three fingers. The bullet had penetrated the liver, opened the extreme lower limit of the pleura, and passed through the extreme outer edge of the kidney. The wound was drained. For two days there were evidences of a urinary fistula. The discharge then ceased, and an uneventful recovery was made.

CASE XLIII A.

Pte. D. A., East Lancs. There was a large entrance wound over the tenth rib, caused by a fragment of common shell. The wound was enlarged, neighbouring ribs being resected. The fragment had opened the pleural cavity, torn the diaphragm, passed through the right lobe of the liver, and was removed from the muscles of the posterior abdominal wall. It measured 1½ in. by ¾ in. Efficient drainage was established, and an uneventful recovery was made.

CASE XLIV.

Cpl. C. H. W., Royal Berks. There was an entrance wound over the right scapula caused by a shrapnel bullet; the bullet could be felt beneath the skin, over the right costal margin. The projectile had obviously traversed the liver, but there being no abdominal symptoms, no operation was done. Two days later slight jaundice developed, and there was free fluid to be made out in the abdominal cavity. The following day the jaundice had deepened, and the amount of free fluid had increased; the abdomen was therefore opened. The abdominal cavity contained a large amount of free bile. Drainage was established, and the discharge eventually ceased.

Cases XLV to LII were unoperated on.

Results of Liver, Gall Bladder, and Ducts Cases.

Total cases, 14.	
Bullet wounds	7
Shell wounds	6
Shrapnel bullet wounds	1
Pure wounds of liver	8
Liver wounds complicated with pleural wounds	5
Duct wounds	1
Recovered	14
Died	0
Unoperated on	8

WOUNDS OF KIDNEY AND URETER.

We have experienced three cases of wounds involving the kidney and one case in which the ureter was damaged.

Morbid Anatomy.

In regard to the kidney wounds, in two cases the injury was comparatively slight, necessitating only a simple drainage. In the third case the kidney was so badly damaged that nephrectomy was necessary. But the apparent triviality of the kidney wound is sometimes no guide to the organic disintegration which occurs. Even in the slightest wounds the organ shows extensive microscopical changes of minute necrosis and haemorrhage.

Clinical Features.

In each of our cases we got our first indication of the kidney being damaged from the position of the wound. One would reasonably expect haematuria to occur; blood was present in the urine in the two comparatively slight cases with which we had to deal; in the severe injury the remainder of the pelvis of the kidney was blocked with blood clot, and there was no indication of haematuria.

Treatment.

Generally speaking, there are three possible operative procedures which one may be called upon to perform: (1) Simple drainage; (2) suturing the kidney; (3) nephrectomy. We employed the first procedure in the two instances in which the damage was slight; a "dressed" tube was passed down to the kidney wound, and gauze was loosely packed around it. This method gave every satisfaction. We have had no suitable case in which to employ the second procedure.

One case demanded the operation of nephrectomy (Case LV). In this instance the spleen was removed in addition to the kidney; the operation was carried out transperitoneally.

In the majority of instances the operation will be done through an anterior incision, by reason of the fact that it is necessary to examine not only the kidney but also the general abdominal viscera.

Synopsis of Cases.

CASE LIII.

Pte. G. F., Rifle Brigade. Wounded by a bullet in the left loin; the projectile passed across the back without damaging the spine and emerged on the opposite side. The left posterior wound was enlarged. The descending colon had been stripped forwards from the kidney, and the projectile had grazed the outer border of the kidney. Drainage was secured, and the patient made a good recovery.

CASE LIV.

Pte. J. J., King's Royal Rifles. There was a small entrance wound in the right posterior axillary line; there was a large exit wound over the right kidney. The posterior wound was enlarged and the eleventh and twelfth ribs removed. The bullet had opened the pleura, damaged the liver, and passed through the outer edge of the kidney. Drainage was established; for two days there was a slight discharge of urine. Eventual recovery.

CASE LV.

Cpl. S. C., Royal Engineers. There was an entrance wound over the spine and an exit wound in the left loin. There was left abdominal rigidity and evidences of internal haemorrhage. The abdominal cavity was opened, and was found to contain a large amount of blood. The spleen was found to be shattered to pieces; it was removed; palpating the left kidney, it likewise was found to be in pieces. The peritoneum to the outer side of the colon was divided and the gut separated inwards; the remains of the kidney were removed; drainage was established in the flank. Recovery.

Wound of Ureter.

We have had a single instance of this injury, and we offer no comment beyond briefly describing the case.

CASE LVI.

Pte. R. J. W., Irish Guards. He was shot at close range in the abdomen, by a machine-gun bullet. On operation there were found to be eight perforations in the small intestine. In addition to blood, the abdominal cavity contained a quantity of urine; this was found to have escaped from a wound of the left ureter, where it passed into the pelvis. As the patient's general condition was grave, no attempt was made to repair the ureter wound, but a drainage tube was sutured in position, and drainage also established in the flank. In addition a resection of small intestine was performed. After the second day there was no discharge of urine, and the patient made an uneventful recovery.

Results of Kidney and Ureter Cases.

Total cases, 4.	
Bullet wounds	4
Shell wounds	0
Drainage	3
Nephrectomy	1
Recoveries	4
Died	0

WOUNDS OF BLADDER.

We have had the opportunity of dealing with four of these cases; three of them were examples of intraperitoneal rupture, the fourth was an example of an extraperitoneal wound.

Morbid Anatomy.

There were two facts which impressed themselves upon us. The first was that an intraperitoneal wound of the bladder is in nearly every instance complicated by wounds of other viscera, usually rectum and small intestine. The second fact is illustrated by Case LIX, in which a non-penetrating wound of the abdominal wall, sustained by a man with a full bladder, may produce a rupture of the bladder; details of the case are added.

Clinical Features.

The clinical features which are observed were complicated by the symptoms of other wounded viscera, except in one case (Case LIX).

The features were those of a somewhat slowly developing general peritonitis, with at first local pain over the bladder, and afterwards diffuse pain. In the intraperitoneal rupture the presence of free fluid in the abdomen could be demonstrated; in the extraperitoneal rupture there was a wound in the perineum, from which urine mixed with blood was escaping. In the uncomplicated case the degree of shock was less than in intestinal injury.

Treatment.

In the intraperitoneal rupture we adopted the operative procedure of a suprapubic cystotomy; in the extraperitoneal variety it was found to be sufficient to drain the bladder per urethram, while a local drain was established in the perineum.

Synopsis of Cases.

CASE LVII.

Pte. W. J., Black Watch. There was an entry wound immediately above the symphysis pubis; there was no exit wound. There were all the signs of extensive damage to the abdominal viscera, and shock was intense. Eight hours had elapsed since the injury. Operation showed a perforation of both walls of the bladder, five perforations in the lower end of the ileum, and a tear of the large intestine at the junction of iliac colon and pelvic colon. The bladder wounds were closed and a suprapubic cystotomy done; the colon wound was sutured and a colostomy performed above; a length of two feet of small intestine was resected. The patient died of collapse about ten hours after operation.

CASE LVIII.

Pte. H. B., Manchester Regiment. This man was wounded by a revolver bullet above and slightly to the left of the symphysis pubis; there was no wound of exit. There were the usual evidences of injury to the abdominal viscera. Operation showed a perforation of the bladder on its left lateral aspect, eight perforations of small intestine, and a perforation of the iliac colon. A suprapubic cystotomy was done, the small intestine was resected, and the wound of the colon treated by suturing and colostomy. The patient succumbed on the following day.

CASE LIX.

Cpl. C. L., 20th Infantry Brigade (German). This case is of special interest because we believe it to be an example of the rupture of a full bladder secondary to a superficial non-penetrating wound of the abdominal wall. There were entrance and exit wounds immediately below the umbilicus. Examination showed that these wounds communicated and were not perforating. There were, however, distinct evidences of infection inside the abdomen. There was no other evidence of wound or contusion. The abdomen was opened; it contained a large quantity of urine. The bladder wall was split on its antero-lateral wall, and the wound was partly extraperitoneal and partly intraperitoneal. A suprapubic cystotomy was performed and intra-abdominal drainage secured. Unfortunately a virulent peritonitis developed, to which the patient succumbed.

CASE LX.

Lance-Cpl. F. J., Royal Engineers. This man, while bending forwards, was hit by a rifle bullet in the perineum; the projectile emerged above the crest of the ilium on the left side. There was a considerable degree of collapse. The abdomen was rigid in its lower part; the patient had passed some blood-stained urine, and blood was escaping from the rectum. Operative measures were carried out under spinal anaesthesia. The abdomen was opened in the middle line; there was a perforation of the mesentery of the iliac colon; the gut was not damaged. The bladder contained a quantity of dark-coloured fluid—urine mixed with blood—but there was no intraperitoneal perforation. The abdominal wall was closed. The patient was now placed in the lithotomy position. A full incision was made in the left side of the perineum and the wound opened up along the lateral aspect of the rectum and bladder. Drainage tubes were placed in position by the side of each organ. A large catheter was passed into the bladder per urethram; the bladder cavity was washed out and the catheter fixed *in situ*. The bullet in its progress had fractured the lateral wall of the pelvis. For two days the lateral bladder tube discharged freely; the discharge then ceased and the tube was removed. The urethral catheter was kept in position for five days. After fourteen days this man was discharged to the base.

Results of Bladder Cases.

Total cases, 4.	
Bullet wounds	3
Secondary rupture...	1
Intraperitoneal	3
Extraperitoneal	1
Recoveries...	1
Died	3

WOUNDS OF THE RECTUM.

Under this heading we only include those cases in which injury was sustained by that portion of the large intestine which extends from the level of the third sacral vertebra to the anal canal.

Morbid Anatomy.

We have experienced two cases representative of this type of injury. In both instances the wound had been sustained in the left buttock; the bullet had at first pierced the gut extraperitoneally, then, emerging intraperitoneally, it had produced further extensive damage in the small intestine. In both instances the lateral wall of the pelvis was fractured, and there was most profuse bleeding from the bone and the pelvic veins.

Clinical Features.

There were all the features which one associates with injury to the abdominal viscera; in addition, recent haemorrhage was escaping from the rectum. As a rule in these cases there is retention of urine, and if urine is voided pain is complained of in the region of the bladder. We have had no means of judging the degree of shock which such a wound by itself would produce, as both cases were complicated by extensive damage to the small intestine.

Treatment.

We at first proceeded to open the abdomen. The wound in the rectum was sutured and an inguinal colostomy performed; any repair of small intestine which was necessary was carried out. In both instances we further attempted to drain the extraperitoneal wound of the rectum by enlarging the entrance wound and passing a tube to the damaged wall of the gut.

Both cases unfortunately ended fatally; the shock produced by the damage to small intestine was apparently the cause of death.

Synopsis of Cases.

CASE LXI.

Cpl. H. J., Seaforth Highlanders. There was an entrance wound of the left buttock, and, in addition, there were the signs of injury to the abdominal viscera. There was no exit wound; the entrance wound was bleeding profusely. The abdomen was opened; there was a relatively small wound in the right wall of the rectum; there were six perforations in the lower end of the ileum, and the abdominal cavity contained a large quantity of blood. The wound of the rectum was sutured and a colostomy performed; the damaged loop of small intestine was resected; the entrance wound was opened up and as far as possible an extraperitoneal drainage of the rectum established.

CASE LXII.

Private S. W., Connaught Rangers. There was a small entrance wound immediately below the left buttock; great abdominal pain was complained of, and there was general abdominal rigidity. The abdominal cavity was opened; the right lateral wall of the rectum was perforated, and there were several perforations in the lower end of the ileum. The rectal wound was closed with sutures, and an inguinal colostomy was done; the damaged portion of small intestine was resected.

Results of Rectal Wounds.

Total cases, 2.	
Bullet wounds	2
Simple wounds	0
Complicated wounds	2
Recoveries...	0
Died	2

GENERAL REMARKS.

We are convinced that in the vast majority of cases of penetrating wounds of the abdomen operative measures offer the best chance of success. We would qualify the statement by excluding from the category uncomplicated wounds of the liver, and certain wounds of the kidney. When the wound affects the hollow viscera of the abdomen, we are satisfied that it is only as the rarest exception that a spontaneous recovery occurs.

When these cases arrive in hospital they are almost universally in a state of intense collapse. We have therefore found it advisable to wait for a period of from one to two hours, until the increased shock of the journey has subsided.

To this rule we make one exception—those cases which show evidences of rapid and progressive haemorrhage; in such cases the risks attendant on immediate operation are taken.

During the interval of waiting it is difficult to decide whether or not active stimulant measures should be adopted. These cases are generally complicated by some degree of haemorrhage, and stimulant measures in all

probability tend to increase the bleeding; we therefore limit the pre-operative stimulation to getting the patient thoroughly warm and administering 1 c.cm. pituitary extract.

During the operation every precaution is taken to minimize the degree of shock; the theatre is thoroughly heated, the table is provided with a hot-water bed; lately we have found it advantageous to operate on these cases while they are in the Trendelenburg position.

Immediately before the operation commences the administration of subcutaneous saline by a Lane's bag is begun, and it is continued throughout the operation; three to four pints of fluid are frequently given in this way. We have tried several different methods of anaesthesia. We have had good results from the use of spinal anaesthesia, but there is difficulty in obtaining the freshly prepared anaesthetic, and it would appear that this is an important detail. In two instances we have had patients collapse suddenly after the administration of this anaesthetic. More lately, and on the suggestion of a paper by Yandell Henderson, we have employed closed ether anaesthesia. The paper above mentioned adduces evidence to show that by this method of anaesthesia shock is considerably lessened.

The method has given us great satisfaction. Briefly the operative technique which we have employed is as follows:

The abdomen is opened in what would appear to be the most suitable situation, and generally in the middle line. A large incision is employed. If the abdominal cavity contains a large quantity of blood, sufficient of this is rapidly swabbed away with a long roll of dry gauze to clear the view. A systematic examination of the various viscera is now carried out. We begin by picking up the caecum and recognizing the ileo-caecal junction; we work back rapidly along the whole length of small intestine, examining not only the gut but also its mesentery. The large intestine is reviewed, special attention being paid to the various flexures. If necessity arises the stomach on both aspects, the duodenum, the liver, and spleen are examined. It is a wise precaution to palpate both kidneys, especially the left kidney, in cases of damage to the spleen. The pancreas is reviewed during the examination of the posterior wall of the stomach. The pelvic viscera are examined last, and to facilitate their examination the residual haemorrhage is more completely cleared away. The question arises whether or not the abdominal cavity should be washed out. In early cases with extensive soiling of the peritoneal cavity we have done so; in later cases, and in those which showed evidences of peritonitis we have not done so. We have found it sufficient to establish drainage by a single Keith's tube, passing into the pouch of Douglas. In special instances such as have already been mentioned we have found it necessary to drain locally or in the flanks.

We invariably close the abdominal wall with through-and-through sutures of silkworm gut, guarded where they pass over the wound junction with small pieces of capillary rubber tubing. A Doyen's handled needle is the ideal instrument for inserting these sutures.

Throughout the operation speed is an important factor, coupled with every possible avoidance of shock.

As regards the post-operative treatment, there is very little which we wish to add; it is similar to that of every other abdominal operation. Special attention is paid to the administration of fluids—for choice by the administration of continuous rectal salines and by subcutaneous infusions.

One is frequently asked regarding the prognosis of these cases. There is this fact to be recognized, that one must be prepared for repeated most bitter disappointments, but when one comes to view a series of cases, the gains seem infinitely greater than the losses. The prognosis, of course, very largely depends on the degree of the injury sustained, but an even more important factor is the length of time which has elapsed since the injury was sustained. Early operation offers the best and surest chance of ultimate success. In reviewing the statistics of the results of such operations as these it is impossible to consider the question *en masse*. Each individual case must be considered, for the chances of success depend upon so many factors that it varies enormously in different instances.

We wish to acknowledge our indebtedness to Colonel Cuthbert Wallace, R.A.M.C., for his encouragement and advice; also to Lieutenant-Colonel Wear, C.M.G., R.A.M.C.(T.), for permission to record these cases. The illustrations are the work of Sergeant Wilson and Private Warr, R.A.M.C.(T.).

A METHOD OF TREATING GENERAL PERITONITIS WITH OBSTRUCTION,

AND ITS APPLICATION IN MILITARY SURGERY.

By W. SAMPSON HANDLEY, M.S., F.R.C.S.,

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My interest in the subject of obstruction secondary to peritonitis dates back for ten years. During this period I have been collecting cases in which, as the result of peritonitis confined to the pelvis, obstruction has supervened. My conclusions were presented in a Hunterian Lecture last year. I showed that the guts below the horizontal level of the symphysis were paralysed, while the bowels above, though distended, retained their contractile power. As the pelvis contains both a length of large and a length of small intestine, there are two obstructions to be dealt with, and the name "ileus duplex" was suggested for the condition.[1]

The success of the treatment I adopted in cases of ileus duplex led me to attack on the same lines the more difficult problem of paralytic obstruction in cases of general peritonitis.

It must here be remarked that not all cases of general peritonitis go on to the stage of obstruction. This is especially the case in children, and I have operated upon a boy of 12 with absolutely universal peritonitis extending up to the diaphragm in whom no sign of obstruction was present. Recovery followed free drainage of the peritoneal cavity. Furthermore, in the early stages of general peritonitis peritoneal drainage is often successful in arresting the spread of the peritonitis and in preventing the onset of obstruction. There are, too, numerous cases of mild paresis of the bowel in peritonitis which can be successfully treated by subcutaneous injections of eserine, by turpentine or ammonia enemata, or by purgatives. This paper deals exclusively with cases in which the accepted modes of treatment have failed to avert or relieve paralytic obstruction of the bowels.

If there is a condition in surgery which is stamped with the word hopeless, it is that stage of a general peritonitis where, in spite of pelvic drainage, cessation of the passage of flatus and persistent foul vomit indicate that complete obstruction has supervened. The rigid abdominal muscles have been forced to yield by the pressure of fluid poured out into the paralysed intestine, and the abdomen is uniformly and tightly distended like a drum. The pulse becomes running, the extremities cold, and the patient, measuring his condition by the abnormal clearness of his faculties, only within a few hours of the end realizes with a horrible certainty that he is in the inexorable grasp of death.

This would be accepted as a true clinical picture of the later stages of general peritonitis. But in abdominal surgery typical "clinical pictures" are of pathological interest only. They imply that the surgeon's chance has gone.

Is it inevitable that cases of general peritonitis should reach the condition thus depicted? There is a preceding stage in which the obstruction is complete, but the pulse is still relatively good, and the vomit has not become offensive. The abdomen is generally distended, but it is absolutely rigid only below the umbilicus. The upper half of both recti is softer than the lower half, and above the umbilicus slight respiratory excursions of the abdomen can still be seen.

This is a stage of general peritonitis which is not recognized in the textbooks, but is known to all surgeons of much clinical experience. It is the stage of the clinical sketch, not of the clinical picture; the stage of deadly struggle, not yet of decisive defeat.

Is the problem presented by such cases really hopeless of solution? By the present methods of surgery it

certainly is. There are, however, certain indications that it may not prove insoluble. Let me tabulate these hopeful indications:

1. General peritonitis is rarely universal.
2. General peritonitis usually begins at the lower limit of the peritoneal cavity and spreads gradually upwards.
3. The persistent vomiting indicates that the stomach and upper bowel retain their contractile power to a late stage.

General Peritonitis rarely Universal.

What is meant by the term "general peritonitis"? The term is loosely used. It is quite certain—and here I speak from my own experience in the operating theatre—that in cases presenting the clinical features of general peritonitis universal peritonitis is rarely found. Any widespread peritonitis unlimited by adhesions is included under the clinical term "general peritonitis." If as a rule the peritonitis involved the upper part of the abdomen, it would avail little that its distribution is rarely universal, for in these circumstances the treatment I am about to suggest would be impossible. Fortunately, however, general peritonitis, whatever the point at which the infection reaches the peritoneal cavity, usually begins in the pelvis and spreads upwards.

In cases of general peritonitis due to appendicitis the infection of the peritoneum invariably starts in the pelvis. It is the rule, even in cases where the source of infection—for example, a gastric ulcer—is in the upper part of the abdomen, that an unlimited peritonitis is at its maximum in the pelvic region, and that it spreads from below upwards through the abodmen. This of course depends upon the fact that gravity carries most of the irritating material down to the lowest point of the abdominal cavity. Moreover, if the rupture is on the anterior wall of the stomach, the great omentum shields the small intestine. If the rupture is on the posterior wall, the contents of the stomach reach the pelvis by way of the right kidney pouch, and do not much affect the small intestine. But there are exceptions. If there is very extensive fouling of the peritoneum, as by the escape of a large quantity of stomach contents through a perforation, or by multiple wounds of the intestine, a true universal peritonitis may be set up. Wallace records death from peritoneal inflammation within twenty-four or thirty-six hours of a gunshot wound. Such cases are, however, exceptional, and it may be stated, broadly speaking, that a so-called general peritonitis is an unlimited peritonitis commencing in the pelvis and spreading gradually upwards, so as to involve a larger and larger area of the peritoneal cavity. This statement is based upon inspection of the abdominal cavity during life in a large number of cases. I am convinced that in the vast majority of cases of general peritonitis a cautious investigation of the upper abdomen would show it to be uninvaded. Among some hundreds of cases of appendicitis with peritonitis I only recollect a single one in which a true universal peritonitis, affecting every district of the peritoneum, was present.

Persistence of Contractile Power in the Stomach and Upper Bowel.

It may seem paradoxical to include the symptom of persistent vomiting among the hopeful indications. There is, of course, a last stage where the vomiting is the mere mechanical overflow along the oesophagus from the over-distended stomach and intestines, and is similar to the gush of stomach contents from the mouth which may be produced by pressure upon the abdomen of a corpse. But in the stage prior to this the vomiting is due to active contractions of the stomach and the small intestine.

That is to say, the vomiting indicates persistence of peristaltic power in the stomach and upper intestine up to within a short period of death.

We have now reached important conclusions which will guide us in attempted treatment: (1) In general peritonitis which, in spite of drainage, has produced signs of intestinal obstruction, which has reached, that is to say, a stage now regarded as hopeless, we can still rely for a time on the functional activity of the muscle of the stomach and of the upper part of the small intestine. (2) In such cases the upper part of the abdomen, roughly speaking that part of it lying above the umbilicus, may be regarded as for some time longer free from peritonitis. In this district we may provisionally assume that surgical operations may be undertaken which postulate the power of repair, such operations, for instance, as intestinal anastomosis. The intestine in this region will be distended because of the obstruction below; it will be inflamed, if at all, only just before the approach of death.

We are now in a position to discuss the indications for operative treatment. It is fairly obvious that any treatment adopted must not involve unduly prolonged manipulation or exposure, and must not add to the shock which is already present. Any method which fails to fulfil these conditions will simply hasten death. It is for this reason partly that the emptying of the paralysed intestine by threading a tube through it has given such unsatisfactory results. Moreover, the emptied intestine still remains flaccid and powerless, and the obstruction consequently persists.

In discussing this question of treatment I must return to the subject of ileus duplex—paralytic obstruction due to pelvic peritonitis. Here, in my opinion, is to be found the key to the treatment of general peritonitis, for I found that recovery could be secured in such cases by anastomosing the suprapelvic ileum to the ascending colon, and then opening the caecum by a caecostomy.

The principle involved might be stated generally in the following terms:

In cases of peritonitis involving the lower part of the peritoneal cavity up to the level of the pelvic brim, when obstruction supervenes, it can be treated successfully by the improvisation of a shortened but complete alimentary canal above that level. The simplicity of this statement gives it the air of a truism, nevertheless I believe it represents a marked advance in abdominal surgery.

We have now to consider whether this principle, which has proved to be successful in cases of pelvic peritonitis, can be extended to the more difficult case in which the peritonitis is general.

In peritonitis limited to the pelvis, the intestinal paralysis affects exclusively the portions of gut contained in the pelvic basin, namely, the lower portion of the ileum, and the pelvic colon and upper portion of the rectum. In so-called general peritonitis, at the time intestinal obstruction supervenes, the line separating the inflamed and uninflamed districts of the peritoneum is, as we have seen, roughly a horizontal line drawn through the umbilicus. Below this line lies paralysed intestine, above it intestine which is still functionally active.

Thus in clinical "general peritonitis" the conditions are not dissimilar in kind from those present in ileus duplex, but the level separating the inflamed district of the peritoneum from the upper uninflamed portion is situated higher up. A much more considerable length of the small intestine is paralysed, and perhaps (*a*) the whole of the ileum may be assumed to be out of action; (*b*) the caecum and ascending colon will be paretic or actually paralysed, so also will be (*c*) the descending colon and the pelvic colon. This stage of peritonitis may be described as the stage of hypogastric ileus. I suspect that nearly all cases of general peritonitis pass through this stage, and that in many of them the stage lasts long enough to allow of hopeful surgical treatment on the lines now to be described more in detail.

The parts of the alimentary canal which are still unparalysed, and therefore available for constructing the suggested emergency alimentary canal, are the stomach, the jejunum, and probably the transverse colon, which lies on the boundary line of the inflamed district. All the rest of the intestine, small and large, is paralysed.

Is Jejunostomy a Satisfactory Treatment?

Under these conditions a jejunostomy might be tried, according to Bonney's suggestion. It would re-establish the current in the unparalysed portion of the intestine. It also might be arranged so as to cut off the reflux tide of septic material passing up to the stomach. It might thus conceivably save the patient's life, but as it would cut off the supply of fluid to the greedily thirsty mucosa of the large intestine it would probably fail, for patients with peritonitis are already starved of fluid.

Treatment by Jejuno-transverse-colostomy with Caecostomy.

If a jejuno-colostomy is made between the jejunum low down and the middle of the transverse colon, uncontaminated fluid taken into the stomach is passed along the unparalysed jejunum into an unparalysed portion of the large intestine, where it can be absorbed. But the caecum and the rest of the colon are paralysed, and there is no outlet from the transverse colon. Distension of the caecum would follow the operation, and rupture of this viscus might be expected. Here, as in ileus duplex, temporary provision must be made for draining the caecum until the inflamed large bowel has recovered its peristaltic power.

My scheme of treatment, then, is as follows:

(1) For pelvic peritonitis and intestinal obstruction (ileus duplex) consequent thereon—ileo-colostomy to the ascending colon with caecostomy (Fig. 1).

(2) For so-called "general peritonitis"—that is, unlocalized peritonitis, extending roughly up to the level of the umbilicus, with intestinal obstruction (hypogastric ileus)—jejuno-colostomy to the transverse colon, with caecostomy (Fig. 2).

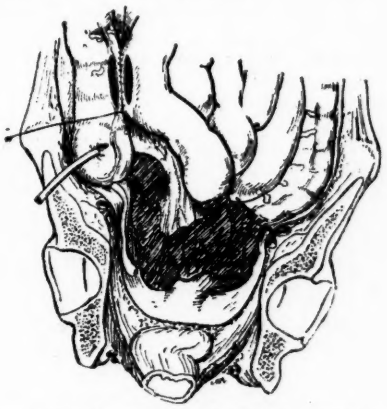

FIG. 1.—Ileus duplex (paralytic obstruction secondary to pelvic peritonitis). Treatment by ileo-colostomy and caecostomy.

In all cases pelvic drainage must be provided.

The advantages gained by such an emergency alimentary canal—consisting of stomach, jejunum, transverse and ascending colon and caecum—are numerous. The normal intestinal current is restored, vomiting ceases, the stomach is not fouled by a reflex of septic intestinal fluid, and becomes once again a clean vessel apt for the digestive processes. For it is clear that fluid regurgitating from the lower intestine will rather pass through the jejuno-colostomy opening into the colon than face the tortuous and active resistance of the jejunum. The jejunum itself receives only the uncontaminated products of digestion from above, and intestinal digestion and absorption can take place unhindered. It is true that the colon will still contain septic fluid regurgitated from below, but the absorptive power of the colon for aught but water is negligible. The colon can perform its important function of water absorption even when its contents are laden with bacteria—their normal condition.

Thus provided with clean food and fluid—the things he most requires—the prospects of the patient's fight with his peritoneal infection are vastly improved.

It may be objected that the steps taken to re-establish the intestinal current will be defeated by the continued upward spread of the peritonitis. In a proportion of cases where the peritoneal infection is virulent this objection is doubtless valid. But it omits to take into account the probability that in many cases intestinal paralysis is the main factor determining the continued spread of the peritonitis. It is well known that distension of a hollow viscus interferes with its blood supply, impairs its nutrition, and renders its walls pervious to the bacteria within. There is every reason to hope that in many cases the relief of the distension in the upper gut will turn the scale in the patient's favour by arresting the further upward spread of the peritonitis. Strong evidence in favour of the supposition is provided by the success of similar treatment in arresting the upward spread of pelvic peritonitis in cases of ileus duplex.

Technique of Jejuno-transverse-colostomy.

The operation of jejuno-colostomy can be quickly and easily carried out without evisceration of the intestines and practically without shock. An incision 4 in. long and extending down to a point 1 in. below the umbilicus, is made through the middle of the right or left rectus muscle. The lower border of the transverse colon is exposed and identified and pulled forward. The great omentum is torn through just below the gut, and two fingers are introduced through the rent to seek for a suitable coil of jejunum. The coil selected, like all the small intestine, will be distended, and may be congested, but it should not have lost its lustre or its resilience. It is drawn forwards into the wound, where it lies just below the fold of transverse colon, which has also been withdrawn. Clamps are applied to the two selected pieces of gut, and a lateral anastomosis is made in the ordinary way. The anastomosis can be strengthened subsequently, if desired, by sewing down the great omentum to the surface of the jejunum. The bowel is returned, the incision is sewn up, and a caecostomy is performed in the ordinary way through a separate incision. It is well to tie

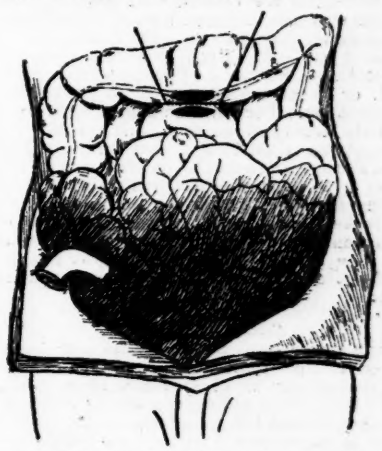

FIG. 2.—Hypogastric ileus (paralytic obstruction of early general peritonitis). Treatment by jejuno-transverse-colostomy and caecostomy.

a Paul's tube in the caecum, but experience may show that a large rubber catheter does equally well.

A Case where the Treatment was Successfully Applied.

An opportunity was lately presented to me, in a case now to be described, of testing the validity of the chain of reasoning I have laid before the reader.

Miss H., aged 30, had for some months complained of vague abdominal pain at intervals, but had not sought medical advice.

On December 29th, 1915, she was taken ill with what was supposed to be a chill on the liver. She kept at her work, and did not consult a doctor. The following day vomiting began, and was repeated soon after she took a purgative. The abdominal pain, of a colicky character, was situated in the lower part of the abdomen. On December 31st she went to town as usual, but was sick and ill, and the pain persisted. On January 1st she was worse, and was then first seen by Dr. A. J. Hogg, of Ealing. He found that she had general severe abdominal pain and tenderness, worse on the left side. There was little movement of the abdomen on breathing. The vomiting had been bilious, and the temperature was 100°, the pulse about 90. At 6 p.m. on the same day the pulse was quicker and the temperature higher. There was great pain in the lower part of the abdomen, and she lay on her back with her legs drawn up. On this day for the first time there was pain on micturition, and in the evening Dr. Hogg asked me to see her with him with a view to operation. About 10 p.m., when I saw her, her pulse was 120, her colour good, and she did not appear to be in much distress. There was slight general abdominal distension, and the abdomen moved to a certain extent with respiration. There was no true abdominal rigidity. In the right iliac fossa an indefinite resistance could be felt. On pelvic examination there was extreme tenderness in the region of the pouch of Douglas, with fixation of the uterus, thickening of the right utero-sacral fold, and some resistance of the right broad ligament. The periods were regular, the last one having ceased a fortnight previously. The patient's statements as to the passage of flatus were rather vague, but she did not appear to have passed it more than once in the preceding twenty-four hours.

In view of the early colicky hypogastric pain, of the signs on the right side of the pelvis, and of the pain on micturition, together with the absence of abdominal rigidity and the presence of resistance in the appendix region probably due to swollen ileo-colic glands, we arrived at the conclusion that the

patient was suffering from pelvic appendicitis. It was thought, in view of the continued vomiting, that intestinal obstruction was likely to complicate the case.

First Operation.

Immediate operation was decided upon, and a median hypogastric incision was made. On opening the peritoneum a certain amount of clear fluid escaped. The omentum was adherent in the pelvis, and on separation it was found to be sloughing at its tip. The coils of small intestine, which now came into view, were rather congested, but had not lost their lustre. The pelvis was packed off from the rest of the abdomen, and on passing the hand down into it, some ounces of thick pus escaped, and a mass was found which on extraction proved to be a swollen and gangrenous appendix containing two large concretions. There was superficial sloughing of a portion of the caecum near the base of the appendix. All the intestines in the lower abdomen were distended by flatus and rather congested, but there were no areas of oedematous, collapsed, and deeply-congested intestine such as are seen in typical cases of ileus duplex. The condition appeared to be general paresis of the pelvic and suprapelvic intestines without actual paralysis, and it seemed likely that eserine and pituitary extract would maintain peristalsis in the damaged gut, but it appeared safer to tie a catheter into the caecum and bring it out through the median wound. The pelvis was drained by two large tubes.

After the operation the patient was placed in the Fowler position, saline was administered subcutaneously to the extent of about six pints for the first twenty-four hours, and injections of eserine salicylate were given every six hours in order to produce intestinal contractions. The catheter, either because it was blocked, or because there were no contractions in the intestine, did not act. Turpentine enemas were given, but only produced a little faecal-stained fluid, and no flatus passed per anum. A purgative failed to act, and forty-eight hours after the operation the condition of the patient was most alarming. The abdomen up to the umbilicus was rigid, hard, and tensely distended like a football. Above the umbilicus the distension was not so marked; rigidity was absent, and there was some abdominal movement with respiration. The pulse had risen in frequency. The patient was not sick, but was troubled by constant feelings of nausea which made her unwilling to take nourishment.

Second Operation.

Since I have never seen a patient recover from a similar condition of general peritonitis with complete obstruction, I told the friends that recovery was improbable in any circumstances, and certainly impossible unless something further was done. It appeared certain that the peritonitis had extended as high as the level of the umbilicus, and that the whole of the ileum and the lower colon were suffering from paralysis the result of the peritonitis. The condition of the abdomen above the umbilicus showed, however, that the upper part of the small intestine—say, roughly, the whole of the jejunum—was still capable of normal peristalsis. Though the ascending and descending colon were probably paralytic, the transverse colon lying at the upper limit of the peritonitic area might be presumed still to retain its contractile power. A lateral anastomosis between the lower jejunum and the transverse colon seemed, therefore, to be the rational method of treatment if combined with a caecostomy to afford a free exit for the contents of the large intestine.

The friends of the patient consented to further operative measures, and through an incision 4 in. long situated 1½ in. to the right of the middle line and extending downwards to an inch below the umbilicus, I reopened the abdomen.

The incision exposed the lower border of the transverse colon, which was distended by flatus and apparently not inflamed. Just below the transverse colon I tore through the great omentum and thus obtained access to the upper small intestine. The first coils it presented (belonging probably to the upper ileum or lower jejunum) were too much distended and inflamed to permit of their use for the lateral anastomosis, a proof that the peritonitis had actually extended up to the umbilicus. Two fingers introduced in a direction upwards to the left succeeded in withdrawing a higher coil, which though distended was not inflamed. This coil was brought forward in the opening in the great omentum and clamped. A clamp was next applied to the closely adjoining portion of the transverse colon, which also had been brought out into the wound. The area was packed off, and a lateral anastomosis was made in the usual way. Since the small intestine, owing to distension and slight oedema, did not hold stitches well, a portion of the great omentum was drawn down over the suture line so as to strengthen it. The bowel was returned and the abdominal incision was sewn up. The caecum was next sought in the original wound at the point where the catheter was tied in it, and here a Paul's tube was inserted.

After-History.

The patient bore the operation well, and her pulse at the end of it was about 120. It should be added, as indicating the virulence of the bacteria present, that the whole of the surfaces of the original incision were at this time covered by a superficial grey slough. The result of this operation was most satisfactory. It was followed by the administration of a purgative, and the following day the colotomy had acted well. A certain amount of fluid material together with flatus had also passed by the anus. The lower abdomen, though still tender, had lost its tension, and the rigidity was less marked. Three days after the operation a tender swelling developed in the right iliac region. There was also some suppuration of the incision of the second operation. The right iliac swelling was opened two days later, and proved to be an abscess in the abdominal parietes, probably due to extension of infection from the region of the second operation. No leakage took place at the lateral anastomosis. When the Paul's tube came out there was a considerable escape of semifluid intestinal contents from the caecostomy, and the bowels also continued to act per anum. The patient's temperature fell, the wound assumed a healthy aspect, and her appetite returned. For some time after the operation a fluid action of the colotomy wound followed each meal. Nutrition rapidly improved and strength returned. The caecostomy wound has contracted, and will no doubt soon close.

The anaesthetics were given by Mr. Herbert Charles. I am indebted to Drs. A. J. Hogg and W. B. Stanford for their unremitting care in the after-treatment, which alone rendered recovery possible.

Conclusion.

The condition of a patient suffering from general peritonitis which is spreading upwards through his abdomen may be compared with the predicament of a house invaded by a rising flood. The householder can only survive the crisis if he retires upwards to the first floor. There he must improvise arrangements for carrying out in a rudimentary fashion the primary needs of existence. There he must cook, eat, and sleep until the flood subsides. The essence of this paper is a suggestion that a similar policy may save patients attacked by the rising flood of a general peritonitis.

Treatment of Gunshot Wounds of the Abdomen.

Colonel Cuthbert Wallace[2] tells us that men shot through the abdomen die mainly from one of three causes: haemorrhage, peritonitis, or intestinal obstruction following peritonitis. Most of the deaths from haemorrhage will take place before the hospital is reached. In the survivors an early operation for suturing or resection of the bowel may avert the dangers of peritonitis and obstruction. It is a triumph of surgery, and still more of organization, that operations of this character are now relatively successful. In wounds of the small gut, when the patient arrives in a condition that permits operation, Colonel Wallace[3] and his colleagues have secured about 50 per cent. of recoveries, a remarkable result when it is borne in mind that the mortality of expectant treatment is 100 per cent.[4] It is an unsolved problem how many of the residual cases die after operation from the mere intensity of the peritoneal inflammation. It seems likely that some of these cases are capable of recovery from the peritonitis alone, but that their chance is spoilt by the onset of obstruction. To such cases the method suggested in this paper is clearly applicable, and possibly with success.

But, though its hypotheses have been stated dogmatically for the sake of emphasis, my paper is to be regarded as suggestive only. I hold no brief for my conclusions, and only ask that they should be tested. It is unnecessary to offer a defence against the charge of premature publication, for at the present crisis many rules, usually salutary, must be suspended in the public interest for the duration of the war.

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THE United States Bureau of the Census is, we learn from the *Boston Medical and Surgical Journal*, about to issue a monograph on deaths from cancer in the United States during the year 1914. It will consist of tables showing the deaths from cancer, according to the site of the disease, age, sex, colour, nativity, and marital condition, for the registration area, the several registration States, and the usual subdivisions. The seven titles for cancer in the international list of the causes of death are subdivided into twenty-nine headings referring to the exact site of the disease. It is proposed to tabulate separately the returns in which the diagnosis was "reasonably certain" and those in which it was "uncertain." In arriving at this distinction, a report is classed as "certain" if the diagnosis was confirmed by microscopic examination of tissues, by surgical operation, or by autopsy. All cases of internal cancer in which the diagnosis was based on clinical observation alone are classified as "uncertain."

"TRAUMATIC GASTRIC ULCERS."

BY

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SURGICAL work with the army in France during the last six months has proved conclusively the value of early operation in gunshot wounds of the abdomen. In his admirable summary[1] of the experience gained by the careful observations of several workers in one army area, Colonel Cuthbert Wallace states the clear rule that a perforating wound of the intestine cannot be healed by spontaneous closure, and that such injuries of necessity must be treated by operative procedures at as early a moment as is possible. With regard to wounds of the stomach there is still doubt, because there are some grounds for the belief that such lesions are capable of cure by natural processes, and because it is certain that the wounds will often be found to lie in areas which are difficult for the surgeon to reach.

Surgeon-General Sir George Makins has discussed this latter question briefly,[2] and his conclusion is that on the whole it is unwise to open the abdomen in cases in which only the stomach is supposed to have been wounded. The advice is confessedly a conservative choice, in view of the lack of sufficient pathological evidence to justify a reasoned conclusion one way or the other. Colonel Cuthbert Wallace admits the probability that some stomach wounds may heal without operation, but none the less he decides that "it is wise to make no exception in the case of the stomach, but to operate on principle," the principle being that any gunshot wound of the intestinal tract is less likely to be fatal if repaired by immediate surgery than it is when left to rest and nature.

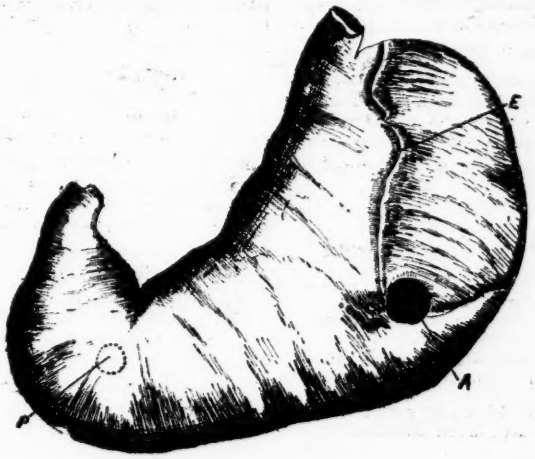

FIG. 1.—Stomach showing traumatic gastric ulceration (Case I in text). A, The anterior perforation. E, The terraced edge limiting the spread of the external ulceration, which had denuded the peritoneal coat. P, The posterior perforating ulcer. (Specimen in War Office collection.)

With perforations of the intestine the chief danger to life arises in the development of peritonitis. In the case of stomach wounds, peritonitis is perhaps rather less to be dreaded since there is undeniably a chance that the aperture may be sealed by adhesions, and since the gastric contents, which may leak out before such adhesions can be cemented, are not very septic. But here a fresh risk appears. The injured tissues are liable to be eroded by the gastric juice, and if a vessel is opened up in this process the wounded man may be in serious danger of losing his life by secondary haemorrhage from what is practically a traumatic gastric ulcer. It is this particular point of ulcer formation which the cases described in this paper have been chosen to illustrate.

Haematemesis and melaena are not often seen as an immediate result of wounds of the abdomen, for the early bleeding in these cases is chiefly from vessels which leak into the peritoneal cavity or into the retroperitoneal tissues. But these symptoms do occasionally appear about the second week, and at that date they are generally to be interpreted as evidence of an extending ulcer in the stomach or duodenum. This ulcer may be developed in a previously healthy mucous membrane as the result either of direct perforation or of contusion, or even, as in the rare case described by Captain Kelly, as the outcome of septic processes which are active at a considerable distance elsewhere in the body. To the naked eye such an ulcer looks very similar to the ordinary non-traumatic acute perforating ulcer of civil life. It commences in the internal mucous membrane, and may extend therein over a much wider area than is shown by the thin, sharply-cut edges of the external perforation. It may have the same result in leading to perforative peritonitis, or to sudden haemorrhage when a vessel is eroded; but it is more liable than is the non-traumatic ulcer to form a gastric fistula, since it may open up the track of the injury first produced by the missile.

CASE I.

No. 229. Under the care of Captain A. Bradford.

December 29th, 1915. Shell wound; a tiny hole over the seventh left intercostal space in the anterior axillary line. No abdominal pain or vomiting, and in consequence the patient was evacuated to the base as being simply wounded in the chest.

Third day: Arrived at base hospital in Boulogne. Vomiting of green fluid commenced and continued until the fifth day.

Sixth day: Melaena appeared with diarrhoea.

Seventh day: Very blanched and thirsty. Moribund and semi-delirious. Pleurisy in left axilla, and physical signs of left haemothorax of moderate size. Nothing abnormal found in abdomen, which was soft and moved freely. Gastric ulcer diagnosed, and food withheld. Patient too ill for operation.

Ninth day: Died.

Post-mortem Examination.

Left haemothorax containing 30 oz. of fluid defibrinated "blood"; lower lobe partly collapsed and coated with granular fibrin. Hole through left diaphragm 5 mm. in diameter. Some thin bile-stained fluid free in the peritoneal cavity, but no evidence of peritonitis.

On the anterior wall of the cardiac fundus of the stomach a round hole 2 cm. in diameter, and nearer to the pylorus on the posterior surface a much smaller hole about 8 mm. across. The stomach contained very little fluid, but a small flake of shell, about 5 mm. long, was found within it, embedded in mucus. Between the stomach and the spleen was a localized collection of several ounces of viscid bile-stained fluid, which did not appear to be purulent and of which the reaction was not tested. This pool of fluid was contained by light adhesions springing from the anterior surface of the stomach, and an outlet from it appeared to be spreading forward by a narrow track along the anterior surface of the left lobe of the liver. The outer wall of the cardiac fundus, where it was submerged in the pool, had been partly digested away, but showed no evidence of gangrene or other injurious process. The perforating ulcer was circular in outline with smooth edges, and it was very much larger than the holes made in the chest wall or in the diaphragm, which corresponded roughly to the size of the piece of shell. All around it the peritoneal coat had vanished over an area nearly 10 cm. across, and the circular muscle fibres of the stomach wall beneath were naked and transparent. A white terraced edge marked the transition from this external ulceration to the normal peritoneum at the attachment of the adhesions. (See drawings; specimen in War Office collection.) The posterior ulcer was closely limited by adhesions, and it did not display a similar external spread. Apparently the haemorrhage had been derived from vessels underlying this ulcer.

The patient died simply from gastric haemorrhage, which commenced about the sixth day. The anterior perforation, had time allowed, would doubtless have led to a subphrenic abscess. The posterior ulcer may have developed out of a perforation or only from an area of contusion in the stomach wall, for the momentum of the small shell fragment was spent when it reached the back of the abdomen. The destruction of the outer wall of the living stomach by the gastric juice, which had escaped from its interior, was a very remarkable fact in this case.

CASE II.

No. 16,502. Originally under the care of Captain R. Charles, who kindly transferred to us the full clinical notes of the case.

January 4th, 1916. Wounded by a bullet with slightly deformed nose, which entered the left epigastrium close to the subcostal triangle. Abdomen opened five hours later; free blood swabbed out of the peritoneal cavity; hole through left lobe of liver sutured and packed. The bullet had subsequently passed through the left sac, and it was found close to the duodeno-jejunal flexure, half in the less sac and half projecting through into the greater peritoneal cavity. Slight bleeding near tail of pancreas. A branch of the coronary artery on the less curvature of the stomach had been wounded by the missile, and this required ligature. At the time there was certainly no perforation of the stomach. Gauze drains were passed down to

the liver wounds, and also to the pancreas through a fresh hole in the mesocolon, while a tube was placed in Douglas's pouch.

Eighth day: Abscess opened in anterior abdominal wall, from which a considerable quantity of clear fluid and thin pus came away.

Tenth day: Again evacuation of pus and of at least one pint of clear fluid. An accident prevented the reaction of this fluid from being tested.

Twelfth day: Severe haematemesis and melaena.

Twenty-eighth day: Chest explored by needle but nothing found. Transferred to base hospital at Boulogne, since the general condition had improved.

Thirty-sixth day: Died.

Post-mortem Examination.

Empyema on left side and purulent pericarditis. Small collections of pus were loculated everywhere between the coils of intestine. No intestinal obstruction.

A blind fistula with yellow-stained walls led down from the anterior surface of the left lobe of the liver into its substance. Close to this a fistulous track ran below the lower edge of the liver and through the gastro-hepatic omentum to a gaping circular ulcer situated on the less curvature of the stomach, half-way between the pylorus and the cardiac orifice. There was no obvious inflammation around this, and no cicatricial deformation had been produced. Within the stomach the ulcer extended over a wider elliptical area along the less curvature, and was much larger than the perforation on the external serous surface. The silk ligature, which had been knotted around the bleeding vessel at the operation, lay in fibrous tissue on the outside of the stomach wall at the edge of the perforation. Bleeding had ceased, but the ulcer remained open and was presumably discharging gastric juice from the fistula. No evidence of fat necrosis was seen in the pancreas. (Specimen in War Office collection.)

In this case death was the result of a widespread and hopeless infection of the serous membranes. At the spot where the bullet had injured the stomach, whether by contusion or through interference with the blood vessels, an ulcer had formed and perforated some time before the sixth day, while its further spread was evidenced by haemorrhage on the twelfth day. The ulcer remained open and showed no signs of healing when death occurred on the thirty-sixth day.

CASE III.

No. 9,399. Under the care of Captain W. H. Oliver.

February 6th, 1915. Bullet wound high up in the left axilla and no exit. Slight haemoptysis, but no vomiting.

Tenth day: Vomiting suddenly began and about 1½ pints of blood were brought up. This was, by mistake, reported as haemoptysis.

Twelfth day: Abundant melaena. Signs of small effusion in left chest. No previous notes had been made of chest condition.

Sixteenth day: Melaena ceased.

Eighteenth day: Pain in epigastrium when food was swallowed. No rigidity over stomach. The patient stated that he had never suffered from indigestion before receiving this wound.

Thirty-first day: Temperature rising to 102°. Physical signs of large collection of air and fluid in left chest. Aspiration removed 35 oz. of yellowish grumous brown acid fluid, which smelt like bitter vomit, and also much air. The manometer readings proved that an open leak existed within the pleural cavity.

Thirty-third day: Rib resected. Acrid fluid and "coffee grounds" deposit of altered blood escaped.

Thirty-fifth day: Clotted milk seen to be discharged from the empyema tube shortly after food had been taken by the mouth.

Thirty-sixth day: Transferred to England in very bad condition. Later history unknown, but it seemed unlikely that he would recover except by the help of unusually successful plastic surgery.

Here the only certainty is that the man bled from a traumatic gastric ulcer on the tenth day, and that some time before the thirtieth day the extension of the ulcer established a direct fistula between the stomach and the pleural cavity. The exact path of the bullet was never determined.

CASE IV.

No. 1,226; T. Under the care of Captain A. Bradford.

May 16th, 1915. Wounded by shrapnel ball, which entered the left chest at the seventh space in the posterior axillary line, and finally lodged beneath the skin over the fifth right costal interspace just below and internal to the right nipple. Patient felt a "smack" in the epigastrium. No vomiting. Slight haemoptysis on the second day.

Seventh day: Fairly well. Slight epigastric pain. Left haemothorax of moderate size with pleural friction at its upper level and over the pericardium. Pleural friction also heard over the right base. Temperature 101°.

Fifteenth day: Profuse haematemesis, followed by melaena for two days. Patient states that he had never before suffered from dyspepsia. The haematemesis came on abruptly with a feeling of nausea, as though he were "sea-sick." Very blanched. Temperature fell from 102° to 97°.

Seventeenth day: Septic haemothorax on left side, which was found to be infected with a streptococcus and a small bacillus, drained by resection of a rib. No evidence of gastric contents in this purulent blood, which was not acid in reaction. The presence of contralateral pleurisy on the seventh day makes it fair to conclude that the haemothorax had been infected at the time of the original wound.

Twenty-seventh day: Solid food allowed.

Forty-fourth day: No further gastric trouble and empyema cavity now very small. Transferred to England. Subsequent history unknown.

The course taken by this ball was so close to the stomach that it probably injured its wall by contusion, if not by actual perforation. The complete recovery from the ulcer that subsequently formed is the remarkable fact in this case, inasmuch as these injuries, so far as we have been able to observe them, have been generally fatal.

These particular cases illustrate the manner in which such traumatic gastric ulcers develop. In all four of them the missile either went through the stomach or so close to it as to cause direct injury to its wall, though it should be remarked that in Cases I and III there was no reason at first to believe from the position of the entry wound that the stomach would be likely to lie in the subsequent path of the missile. The ulcer revealed itself by haematemesis and melaena on the 6th, 10th, 12th, and 15th day respectively in each. One patient died directly from the haemorrhage; only one made a complete recovery. The cases suggest the clinical interpretation that must, with a slight reservation to be discussed later, be made of these symptoms of bleeding when they appear in the second week after a wound, and they also show the unfavourable course that may be taken by an injury of the stomach when it has not been repaired by the surgeon. But they are in themselves too few to serve as a basis for a forcible argument in favour of early operation on supposed wounds of this viscus.

A consideration of the general mass of statistics out of which these cases were chosen throws more light upon the disputed point. Taking the *post-mortem* records in the first place, examinations have been made by us on 100 consecutive cases of death at the base hospitals from wounds penetrating the chest wall. In 17 of these the missile, whatever its point of entry, had passed in its course through structures in the right base of the chest. Only eight examples were met with of a similar track through the left base. Therefore, since the incidence of wounds on either side of the chest is probably equal, it may be concluded that the left base is a more vital spot, and that the preponderance of fatal chest wounds on the right side met with at the base is due to the fact that men with wounds on the left side show grave symptoms early and die close to the fighting line. Kidney and colon are almost equally balanced on either side, so that the difference in fatality must depend on the contrast between the liver on the right and the heart, stomach, and spleen on the left.

Of the 17 fatal cases on the right side, 11 had haemothorax, and in 9 of these death was chiefly caused by the infection of this blood; 3 had wounds of the colon, and all 3 died from the resulting septicaemia; 12 had wounds of the liver, of whom 5 died of haemorrhage from the liver; there were 7 harmless liver wounds.

Of the 8 fatal cases on the left side, 5 had haemothorax with 3 septic deaths in consequence; 2 had liver injuries, of which one died from secondary haemorrhage. There were no cases of wound of the heart, and only two of actual wounds of the stomach. Of these two stomach injuries, one died of peritonitis consequent upon the perforation, and the other from gastric haemorrhage (Case I). A third died of general peritonitis, and his stomach was full of blood, though no actual injury to this organ was found. So the only stomach wounds that were seen in this group were in themselves fatal, and no example was met with of a relatively harmless injury to the stomach, although this might have been fairly expected to occur in a series where chest wounds in general were being investigated. There were in the series, it should be remembered, seven examples of harmless liver wounds where death was due to other causes.

Post-mortem examinations at the base of fatal wounds penetrating the abdomen were not made by us as systematically as those of the chest. In a total of twenty-five

consecutive cases there were four instances of stomach wound, which gives six altogether when we include the two already referred to under wounds of the chest. Out of the entire six five had died as the direct result of the gastric lesion, three being from haemorrhage and two from peritonitis. The single exception died from general peritonitis caused by intestinal perforation, and in this there was discovered an actively spreading gastric ulcer in relation to a slight contusion of the stomach. Once more in the fatal abdominal, as in the fatal thoracic, wounds there was no example observed of a harmless wound of the stomach.

So far, then, as can be argued from *post-mortem* evidence derived from cases of death in men who survived long enough to be transferred to the base, a gastric wound is serious and likely to be fatal. The conclusions from the indirect evidence of survival cases is of a similar nature.

In dealing with wounded men who survive, it is rarely possible to be certain that any particular organ has been hit, even though the apparent path of the missile crosses the region in which this organ lies. *Post-mortem* evidence alone gives the sure knowledge. Still, it is permissible to make rough generalizations which depend on the assumption that the path of an in-and-out missile can be indicated by the straight line connecting the points of entry and of exit. In a series of 365 non-fatal chest wounds, recorded by one of us, the number of in-and-out wounds was tabulated. Survivors from such wounds in the upper two-thirds of the thorax were numerous. In the lower third they were relatively few. Excluding surface tangential wounds, there were twelve penetrating wounds of the right base through the liver area, and of these three actually developed biliary fistulae.[3] Through the left base, on the other hand, there were only six survival cases noted. From this fact again emerges the same deduction as that already arrived at by *post-mortem* evidence—namely, that the left base is twice as fatal a target for a penetrating wound as is the right base of the chest.

Of the six survivors the details were as follows: Two showed no symptoms beyond those of a simple lung wound; one had a haemothorax infected with *Bacillus coli*, that may have come from the splenic colon; three exhibited symptoms of epigastric tenderness and vomiting or pain after food, which suggested injury to the stomach. All these three recovered, but one (Case IV) nearly lost his life from a spreading traumatic ulcer. The other two showed no development of other untoward symptoms while in France, and their subsequent history was not ascertained, though it was reported indirectly that one of them had developed a hernia of his stomach through the diaphragm into the pleural sac.

Summarizing the whole of these facts, one sees that wounds of the left base of the chest are twice as fatal as those of the right; that among men wounded in the thorax or abdomen who survived long enough to reach the base hospitals in France and there died, only six examples of gastric injury were found by us, while five of these injuries were the direct cause of death; and, finally, that in survival cases there were only three who showed symptoms which might be ascribed to stomach injuries, and that of these the only one who could unhesitatingly be accepted as a case of gastric injury nearly died from that injury. These figures were obtained from the study of a considerable number of wounds of the chest (total 465) and of the abdomen (total 25), and they demonstrate that the majority of men who have been shot in the region of the stomach die before they reach the base hospitals, and that those who do reach the base with stomach injuries generally succumb to their wounds. The conclusion seems clear, and it is this, that an operation at the earliest possible moment gives the best chance of recovery from a stomach wound, so that laparotomy should be undertaken when the track of the missile suggests the probability that this organ has been wounded. If abdominal exploration reveals a perforation or a bruise of the stomach, it may be judged by the surgeon that the best procedure is to invaginate the wall over all the area of injury, so as to lessen the chance of later perforation if an ulcer forms.

Secondary haemorrhage from a later erosion by the gastric juice will occur only in special areas where the larger vessels lie—that is, chiefly along the less curvature and from the posterior wall if this becomes adherent to the underlying solid organs. Here it would be peculiarly difficult for the surgeon to gain access to the injury. We are not aware of any attempt that has been made in France to deal with such an ulcer by immediate operation during the bleeding. It is probably best at this later stage to treat the haemorrhage on expectant lines by the routine measures which are adopted for profuse bleeding from non-traumatic gastric ulcers in civil life. But the danger of ulceration should always be borne in mind where a stomach wound is suspected or known to exist; and the diet, even after operation, should be very strictly guarded in such a way as will both minimize the secretion of gastric juice, and soak up that which may be discharged into the stomach. It is most necessary to forbid categorically the use of meat extracts, such as bovril, for these, in the absence of explicit orders to the contrary, are likely to be given to the wounded man as an early restorative, and they will evoke an abundant and active secretion, which finds nothing but the half-dead gastric wall to feed upon.

At the outset of this paper we mentioned the possibility of gastric or duodenal ulcers occurring when the viscus was not directly injured by a missile, but where its mucous membrane had suffered some local devitalization through the indirect action by the blood stream of septic processes elsewhere in the body. The classical example of such a lesion is the duodenal ulcer that has occasionally been reported in civil practice as a consequence of widely-spread cutaneous burns. But in the last few years pathological work on the nature of ulcer formation has tended more and more to emphasize the probability that many acute gastric ulcers may have a similar origin in various poisonous and infective processes which affect the body in general and only indirectly injure the stomach.

With these views in our mind, we have repeatedly examined the inner surface of the stomach and duodenum at the autopsies of death from severe sepsis, and especially when the skin surface had been widely destroyed by multiple shell wounds. No examples of such acute ulceration were discovered. The sole instance we are able to relate is that for which we are indebted to the clinical diagnosis of Captain Kelly, who called our attention to the importance of the case (No. v). Nor have we observed in the wards, during an experience of sixteen months, any patient who showed, during the recovery from wounds, symptoms which could justify the diagnosis of such an ulcer formation. The very few cases of haemorrhage from acute gastric or duodenal ulcers that we have met with among unwounded soldiers were of the ordinary type seen in civil practice, and, with one exception, all recovered.

CASE V.

No. 5,884. Under the care of Captain Fitzmaurice Kelly, who had made a complete diagnosis of the nature of the lesion in the patient and kindly gave us his clinical notes of the case to complete the series of these ulcers.

January 18th, 1916. Severely injured by multiple shell wounds, in the left orbit, right upper and fore-arm, right groin close to the femoral vessels, left scrotum disorganizing the testicle, and in the right leg with compound fracture of the tibia.

Third day: Admitted to base hospital. General condition very good but groin and leg wounds suppurating with a very foul infection. Wounds cleaned under an anaesthetic, and left eye excised.

Sixth day: Left testicle removed, right groin opened more freely, and fragments of tibia partly removed.

Eighth day: Slight haematemesis occurred, and was followed by profuse melaena.

Tenth day: Patient died, after repeated haematemesis and melaena. The wounds remained in an intractably foul condition until the end. There was no extensive sloughing or destruction of skin surfaces.

Post-mortem Examination.

External wounds as described above, and extremely foul. The internal organs were all utterly blanched by the haemorrhage. Slight recent pleurisy over base of left lung. No endocarditis. Stomach dilated and its inner surface covered with a thick layer of inflammatory mucus. Just beyond the pylorus lay an acute duodenal ulcer, 2 cm. in diameter, with sharply cut clean edges, which had eroded one of the pancreatico-duodenal vessels. The intestines were filled with melaena. There was no peritonitis nor any evidence of injury to the abdominal organs. In connexion with the groin wounds there was some retroperitoneal haemorrhage which had extended up to the brim of the pelvis, but this was well drained, and its upper area was free from obvious sepsis.

Death was caused directly by the duodenal haemorrhage, commencing on the eighth day, and in this case the ulcer was certainly not caused by a wound near to the duodenum. Though the ulcer was large and deep, its appearance was that of a recently formed and acute one, and this opinion was confirmed by microscopic examination. There was no scarring or deformity around it, and the base was formed by soft pancreatic substance. Unfortunately the patient was too ill to be able to give any reliable answers on the question whether he had previously suffered from indigestion of such a nature as would have indicated the presence of an old ulcer. It is unlikely that he had been a dyspeptic, for he was a well-built soldier, 19 years old, enlisted a year back, and with four months' continuous service in France.

Summary.

1. The evidence related in this paper negatives the assumption that wounds of the stomach are less likely to be fatal than wounds of any other part of the intestinal tract.

2. A perforation or a contusion of the stomach wall by gunshot wounds is liable to be followed by the development of a spreading gastric ulcer, which in certain anatomical positions will erode vessels and determine a fatal issue from secondary haemorrhage.

3. Haematemesis and melaena occurring in the second week after a wound are generally to be regarded as the outcome of such a traumatic ulcer. These symptoms are very rarely due to haemorrhage from a non-traumatic ulcer produced indirectly as the result of septic wounds elsewhere in the body.

4. If a stomach wound has not been repaired by operation within the first twenty-four hours after the injury has been received, or if there is reason to suspect the possibility of such a wound being present, the diet should be rigidly controlled on such lines as will lessen the active secretion of free gastric juice.

REFERENCES.

[1] *Lancet*, December 18th, 1915. [2] *Journal of the Royal Army Medical Corps*, January, 1916. [3] Cf. Elliott and Henry, BRITISH MEDICAL JOURNAL, January 1st, 1916.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

INFECTIOUS JAUNDICE.

WE desire to call attention to some peculiar bodies, to which our laboratory assistant, Mr. Mann, drew our notice, in the urine of a case of jaundice with albuminuria, from Mudros.

On examination of the sediment with a low power the first thing that struck us was the presence of numerous light yellow-greenish bodies, circular or pear-shaped in outline, and of a markedly granular appearance. On examination with a $\frac{1}{6}$ in. it was seen that there was no marked differentiation of endoplasm or ectoplasm. The nucleus, usually relatively large, was easily seen. The size of the bodies varied from 8 μ or less to 33 μ or more, probably averaging about 20 to 25 μ.

When carefully watched for some time, protrusion of a pseudopodium could be observed. This relatively clear protrusion contrasted markedly with the semi-opaque granular endoplasm. These bodies were totally unlike *Endamoeba coli* or *Endamoeba histolytica*.

No cystic forms were seen in the urine. In the faeces cysts of *Endamoeba coli* were seen.

We have named it provisionally *Amoeba urinae granulata*.

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THE late Dr. Isaac Ott, of Easton, Pennsylvania, left money for the endowment of a new chair of physiology at the University of Pennsylvania to be known by his name. DR. OTT was known to the scientific world by his researches on the physiology and pathology of the nervous system.

Reviews.

SURGERY IN WAR.

WE have received within the last few weeks copies of two manuals of war surgery, the one in English and the other in French. They are, we believe, the first written in either language which are frankly based upon experience gained during this war. Some other handbooks which were published a year or more ago might be more properly described as attempts to apply opinions formed before the war to the new conditions. Such books are now out of date; their places will quickly be taken by such volumes as those now before us.

The English volume, *Surgery in War*,[1] is largely the work of Major HULL, who has seen the present campaign through from the beginning to the present time. He has been assisted by Colonel H. M. W. Gray and a number of other officers on active service, most or all of whom, it would appear, have been serving in France. The subject has therefore been dealt with more as regards surgical work there than in the other spheres in which our army has been and is now engaged.

In a preface which Sir Alfred Keogh has written for the book he states that "there comes a time in a long campaign like the present one when it is profitable to take stock, as it were, of the surgical position, to apportion values to various methods of treatment and to obtain some appreciation of their results." This, we venture to think, the present volume does in a very creditable manner. The circumstances of the present war have made necessary the reconsideration of most of our ideas on military surgery. The South African campaign was carried out in a country entirely different from that of France and Belgium; those who served there saw, as Major Hull states in his introduction, results which ill prepared them for a campaign fought in weather with a large preponderance of wet days, and upon a soil artificially sown with bacteria, mostly of faecal origin. The nature of the weapons employed also has exercised a potent influence upon the surgical treatment in this war. To surgeons it will be known as "the pointed bullet war," but attention is called to the increased proportion of wounds due to artillery fire and their greater liability to septic infection. Statistical results have had to be excluded at this stage of the campaign in deference to the wishes of the censor.

The chapter on bacteriology of wounds in war has been written by Lieutenant-Colonel Harrison. He urges that in dealing with tetanus "the administration of antitoxin must be supplemented by thorough eradication of the focus of infection." This may be possible where there is a single small wound, but can hardly be carried out where there are several wounds, some of which have involved joints and internal organs, so that it is not possible to say which was the focus. He suggests that 10 to 15 c.cm. of antitoxin should be injected into the lumbar sac and 100 c.cm. intravenously in one or two injections as soon as possible after the commencement of symptoms. For the mechanical removal of bacteria from the depths of the wound Colonel Harrison favours the use of eusol, since it adds to its lymph lavage properties that of being acid, an acid reaction of the medium being inimical to the production of toxin. The use of other strong antiseptics and pastes is condemned, for the aim should be to remove the anaërobes by setting up a free flow of discharge through a sufficient wound opening. This statement is sound common sense.

Dr. Greenfield has contributed a very useful chapter on the general condition of the wounded and their treatment. He emphasizes the importance of giving pituitary extract, condemns the use of strychnine, and recommends full doses of morphine in the treatment of shock; this is in agreement with Crile's teaching. Patients with severe bone injuries stand repeated manipulations of the limb very badly, even when under an anaesthetic. No major operation should, it is said, be attempted without infiltration anaesthesia. Novocain solution $\frac{1}{2}$ per cent. with adrenalin chloride had given good results, and if potassium sulphate gr. x be added to each ounce the effect is prolonged and pain after the operation is much lessened.

[1] *Surgery in War*. By A. J. Hull, F.R.C.S., Major R.A.M.C.; with a Preface by Sir Alfred Keogh, K.C.B., M.D. London: J. and A. Churchill. 1916. (Cr. 8vo, pp. 404; 24 plates, 55 figures. 10s. 6d. net.)

Preference seems to be given by other contributors to the use of hypertonic salines rather than antiseptics. The bold statement is made, in speaking of the treatment of septic wounds by excision, that "a septic compound fracture of the skull can be made to heal almost with certainty, provided the patient comes under treatment in reasonable time." This is, we believe, not the experience of all surgeons, and though in a certain number of cases this desirable result may be obtained, the suspicion must remain that it will always be the exception rather than the rule.

An excellent and careful description of the *x*-ray localization of foreign bodies is given by Lieutenant W. A. Edwards.

Compound fractures must bulk very largely when dealing with casualties in warfare, and it has to be borne in mind that the missile which causes the fracture usually infects the wound, and oftentimes carries into the medullary cavity of the long bones a portion of the patient's clothing. The view taken in the manual is that, with the exception of small perforated wounds, all wounds complicating compound fractures require exploration, which should be carried out as soon as possible after the receipt of the injury. The use of Thomas's splints applied as described by Lieutenant-Colonel Robert Jones is spoken of very highly, not only for the femur but also for the humerus.

The administration of urotropin (15 to 20 grains every three to four hours) is advised in every case of gunshot wound of the head. Attention is called to the opinion expressed by French surgeons "that all wounds of the skull should be trephined at once. Trephining (in their opinion) is the operation of urgency, *par excellence*, in military surgery." A thin flap of fascia from the thigh forms the most convenient tissue for the repair of lacerations of the sinuses.

It is difficult exactly to understand what is meant by the sentence "immobilization by application of a wire may be considered in some cases," which occurs in the discussion of secondary haemorrhage complicating fracture of the femur.

Stress is laid upon the fact that abdominal wounds in this war differ materially from those seen in South Africa, and we gather that Major Hull's view is that where possible practically all cases should be operated upon as soon as possible, early operation being essential, especially when the missile has penetrated the lower and lateral portions of the abdomen. Reference is made to Colonel Mayo Robson's article in the BRITISH MEDICAL JOURNAL of December 4th, 1915, and the excellent results to be obtained in such cases.

Captain Miller writes the chapter on gunshot wounds of the chest, and Lieutenant Snowden that on wounds of the peripheral nerves, and Dr. Greenfield has supplied excellent illustrations.

We have attempted to indicate the character of the book by way of quotation rather than criticism, because in this way, perhaps, readers may best be inspired to peruse it for themselves. It must prove helpful to all surgeons who are engaged in the treatment of the wounded at home as well as abroad, and should be in the hands of every officer of the Royal Army Medical Corps.

The French book, entitled general indications for the treatment of wounds in war,[2] is conceived in a different spirit. It is more dogmatic, and in a sense more elementary. Its author, Professor G. MARION, is surgeon to the great Lariboisière hospital in Paris, and médecin major de première classe—the French army is under the disadvantage that its medical officers are not members of a corps, as in ours. M. Marion has clearly had a great deal of experience in this war; his book is founded on that, and it is all the more interesting because it is very personal. For M. Marion there is always one thing to do and one way of doing it, and the surgeon inexperienced in war wounds who follows his instructions will at least feel that for each there is a well thought out reason. Such a book need not be criticized in detail; it must be taken for what it is—the opinions of a strong personality strongly expressed.

It falls into three parts; the arrangement of the first part is admirably logical. The treatment of a wounded man is divided into three periods—immediate, secondary, and late. It is perhaps due partly to the nature of M. Marion's experience and partly to his manner of presentation that the first two periods are far better dealt with than the last. Of penetrating wounds of the abdomen he says that if an expert surgeon (chirurgien de carrière) possessing a complete surgical equipment is called upon to treat a man in whom shock is not pronounced he ought to operate. If the surgeon is not "un chirurgien rompu à la chirurgie abdominale," or if the equipment is in any respect defective, or if the wounded man is profoundly depressed, then the surgeon ought to abstain from operating, satisfying himself with superficial disinfection of the wound, and the application of a simple dressing; an icebag should then be applied to the abdomen, the trunk raised, the diet restricted, 10 cg. of opium given daily in two doses, and the patient kept in the ambulance until all danger of peritonitis has passed. The treatment of haemorrhage, of protrusion of intestine, and of lesions of the kidney or bladder, is then more particularly considered. In discussing treatment in the secondary period M. Marion recommends for peritonitis following a penetrating wound median suprapubic incision and the introduction of drains. This treatment, combined with the sitting posture, administration of serum, or such stimulants as camphor or caffeine, will, he says, now and then save some of these cases. Nothing more, however, should, he thinks, be done, for an attempt to suture the intestinal wound at this stage will cause diffusion of the infection, even if the patient survives the operation.

Of fractures of the cranium he says that even if there be no more than a simple fissure there can be no doubt that it is urgently necessary to trephine provided the environment is suitable. "It has been fully proved," he adds, "that as a cranial operation is benign and efficacious if performed before any evidence of meningo-encephalitis appears, so any operation performed after the lighting up of this dreaded complication is useless." M. Marion adds to many of his sections "don'ts"; those to this section are: (1) "Don't be satisfied with disinfecting the wound without touching the fracture"; (2) "Don't, when trephining is performed, make explorations in the brain with forceps, probes, etc." In the next section, dealing with penetrating wounds, it is said that the indications are the same, and the "don't" here is "Don't search for the projectile in the course of a trephining performed to secure disinfection of the wound." The extraction of the foreign body, he says, should only be attempted after all trace of infection has disappeared, and after it has been accurately localized.

The second part of the book is concerned with the localization of foreign bodies, and an apparatus in which the method of crossed cords is used is described at length, and strongly recommended.

The third part of the book describes apparatus for the treatment of complicated fractures and joint wounds. Like many other French authorities, M. Marion makes much use of plaster, but he praises and illustrates several splints made with the aluminium rods issued by the British Army Medical Service. We note with satisfaction that M. Marion points out the necessity, in treating injuries of the wrist, of keeping the joint in extension, inasmuch as if ankylosis does occur the position of extension is that in which the fingers will have the greatest power.

NOTES ON BOOKS.

MEDICAL men all the world over owe a debt of gratitude that is always increasing to those responsible for the compilation of the *Index-Catalogue of the Library of the Surgeon-General's Office, United States Army*.[3] As any one who has ever had to look up references in medical literature knows, the *Index-Catalogue* gives the best lists of the literature of medical authors and medical subjects in existence. The library on which it is based contains over 190,000 bound volumes and 328,000 pamphlets. The first and second series contain over two million titles of authors and subjects. The last volume to appear is the twentieth of the second series, including from V to Waterworks.

[2] *Indications générales du traitement des plaies de guerre.* Par G. Marion, Médecin Major de 1re classe. Paris: A. Maloine et Fils. 1916. (Post 8vo, pp. 190; 38 figures. Fr. 4.50.)

[3] *Index-Catalogue of the Library of the Surgeon-General's Office, United States Army.* Authors and Subjects. Second series, vol. xx. V-Waterworks. Washington: The Government Printing Office. (Imp. 8vo, pp. 603.)

British Medical Journal.

SATURDAY, APRIL 8TH, 1916.

WHAT IS A TEUTON?

Not long ago we lived in happier times; we had a settled nomenclature in our English anatomical text-books until one coined in Germany was foisted on us; we had well-recognized Latin names for the various species of animals until a new law was introduced—largely German—that has landed zoologists in a Tower of Babel, no man being certain of what the proper name for a species may be. In olden times the Aryans were a real live folk; they lived originally in the high plateau region somewhere between the Himalayas and the Caspian; they broke westwards into Europe, bringing with them the mother forms of all the tongues we now speak, and they broke eastwards into India. Now the Aryan in the form we got to know him and like him is going; he is proving a "Mrs. Harris"—a supposititious person called into being by students of words who wanted to account for the relationship which exists between European and some Eastern languages. In those happier times we knew who the Kelt was—we wrote the word as "Celt" then; for us in these islands he was the descendant of an ancient native of the "Celtic fringe"—Ireland, West Scotland, Wales, and Cornwall. Much as the various constituent peoples of our Celtic fringe differ in stature, in colouring, and in make of body, there is one character they have in common—in all of them there prevails the same type of head form. It is not enough to say that they are long-headed (dolichocephalic), for there are many types of long heads, just as there are many types of round heads.

No greater mistake could be made—and modern anthropologists have not taken care to emphasize this aspect of the matter—than to suppose that two skulls which have the same proportion of width to length—that is, have the same cephalic index—are of identically the same type and race. In the case of our Celtic fringe the long-headedness is of the same type; the British Kelt is, in the vast majority of cases, a long-headed individual. In France, ever since the time of Broca, a totally different kind of individual has been regarded as the true Kelt. Broca accepted Caesar as the standard authority; to Caesar the inhabitants of middle Gaul were typical Kelts; graves of the Roman period show that Caesar's Gauls had the same rounded—or brachycephalic—head form as the modern French. For Broca—and Broca was followed by anthropologists in nearly all countries—the Kelt was a broad headed individual, with his own peculiar form of broadness.

We do not know when the long-headed and broad-headed European strains separated from a common stock, but we do know that head form breeds true over a space of ten thousand years, and that the difference in head form is one of real racial significance. We therefore cannot continue to use "Kelt" as a racial name, for we do not know whether the speaker is referring to one or other of two opposite European stocks—the broad-headed central European or the long-headed West Highlander.

In those olden times, before King Edward came to the throne, we were happy and almost unanimous in our use of the word "Teuton." The Anglo-Saxons were Teutons; the Germans said we were their cousins; standard works on geography and ethnography, both in England and in Germany, still reproduce a map wherein Germany, Sweden, Norway, Denmark, Holland, and Great Britain are coloured in the same tint, showing them to be parts of Teutondom and their inhabitants Teutons.

Is a Teuton, then, an Englishman or a Prussian? We are at deadly war with Germany, but that does not mean we may not be cousins; near relatives have often the fiercest of quarrels. We had a bitter feud with our children in America. May we not be making the same mistake about the Teuton as about the Kelt? A close study of a book which has just appeared[1] from the pen of the Right Hon. J. M. Robertson, M.P., leads to the conclusion that the word "Teuton" is applied to two kinds of men which, in an anthropological sense, are totally different, and that, like "Kelt," "Teuton" also must be discarded from our scientific vocabulary. Mr. Robertson has won for himself a high reputation in many lines of human endeavour as journalist, politician, historian, and philosopher, but with all his learning there is one department of quite useful knowledge he has not really absorbed, and that is the study of human races as practised by modern anthropologists. He examines what some of them have to say regarding the German shape of head, and finds they can give him no help. He takes the writings of Houston Stewart Chamberlain almost as seriously as the Germans have done—the writings which picture the natives of the German empire as blessed with all the qualities of heroes, as the supermen of the present, and masters of the world in the future. British anthropologists have never made that mistake, but they have made an equally great one—they have never taken the trouble to inform their countrymen that the word "Teuton" covers two very different types of humanity.

That discovery was made by a man who is held in high repute by every one who values the history of medicine—Virchow the pathologist. The discovery, which came to him in the light of a tragedy, was made in the following manner: At the close of the Franco-German war Quatrefages, who then occupied the chair of anthropology in the Natural History Museum, Paris, made certain aspersions regarding the racial nature of the Prussians. Virchow took the charge quite philosophically: he admitted that very little was known of the racial nature of the German people, but it is also quite apparent from the manner in which he set to work that he was confident of proving that his fellow countrymen of the north were true Germans or Teutons of the classic type—long-headed, fair-skinned, fair-haired, and blue-eyed. He went to find and study his typical German on the west coast—Holland and Frisian lands north of Holland. He found the classic German there—a man not unlike the typical Norwegian, Swede, Dane, or Englishman. He then set on foot an excellent scheme—one which aimed at taking a census of the physical characteristics of the German people—beginning with school children. The colour of the hair and eyes was taken first; in that respect Prussia came off with flying colours; its natives had the fairest hair and bluest eyes of all the people within the empire. In that respect the attempt to prove that the German people were classical Teutons was successful. But as regards head form the case proved quite different; Virchow soon became convinced that the vast majority of the German

[1] *The Germans: (I) The Teutonic Gospel of Race; (II) The Old Germany and the New.* By the Right Hon. J. M. Robertson, M.P. London: Williams and Norgate. (Price 7s. 6d. net.)

people were not long-headed. In the south—Bavaria, Würtemberg, and Baden—the people were, almost without exception, broad-headed of the Alpine or French Keltic type, and with dark hair. In the north and north-east—Prussia, Brandenburg, Posen, and Silesia—the people were broad-headed of the Slavonic type, but with fair hair. Of the seventy millions of people now living within the German empire, not more than eight millions, occupying a coastal fringe on the west and scattered along the Baltic shores, are of the classical fair-haired long-headed type. Which is the Teuton—the small western long-headed fringe or the round-head central mass? In a strict anthropological sense the word "Teuton" has ceased to be usable.

It cannot be too clearly understood that Germany and Britain stand not only for two opposite ideals of life but also for two opposite ideals of manhood. In Europe to-day there are about 420 millions of people. In an anthropological sense they fall into four groups. The long heads are in the West and in a minority. They have now, they have had since the dawn of history, the command of the sea. Spain and Portugal stand for the dark-haired long heads; Great Britain, with a dash of the dark long heads in her "Celtic fringe," stands for the fair-haired long heads. She has behind her the Scandinavians, the Danes, the submerged German West, the Dutch, the Flemings, and to some degree the people of Normandy—about ninety millions of fair-skinned long heads all told.

It did not need the present war to prove that war has little to do with race; it has much more to do with language, tradition, and national ideals. This at least is certain, that so far as Britain is concerned in the present war, it is not an inter-Teutonic strife; nothing is more certain than that the great mass of the Germans and of the British people are of a totally distinct lineage.

INDUSTRIAL FATIGUE AND ITS CAUSES.

THE Health of Munition Workers Committee has added to its list of valuable memorandums one dealing with the causes of industrial fatigue,[1] which seems to set the crown to its work, for it is written with physiological knowledge and human insight. A new era will open in the prosperity and happiness of the nation if employers and workpeople can be made to grasp the importance of such an essay as this, and recognize that the physiological laws of life must be studied and followed. A short-sighted struggle for more money, shorter hours of work, and trade union restrictions of output cannot secure human happiness. It is not these crude conditions of the daily task that matter, but the opportunities of developing mind and character, of perfecting skill, of gaining success and advancement by triumphing over obstacles, of keeping physically fit in hygienic surroundings, of securing leisure to enjoy the money earned, opportunities to spend it wisely in a garden city surrounded with playing fields, and affording every worker a chance of realizing the beauty and grandeur of the universe, of the changing seasons, the flowers and the stars.

The Committee defines fatigue as the sum of the results of activity which show themselves in a diminished capacity for doing work, and points out that it is wholly fallacious to take the bodily sensations as a guide and measure of fatigue, for there may be diminished capacity for work before any signs of fatigue appear in sensation. Fatigue results not only from the exhaustion of substances supplying chemical energy for doing work, but from the accumulation of the products of the chemical changes. It can be compared, not to the running down of a clock, but to a clogging of the wheels with dirt. The chemical products of activity are removed by the blood, and time is required both for this and for the process of restoration. "If the activity is repeated too quickly to give time enough for restoration after each action, fatigue will become progressively more intense as the debit balance accumulates."

Since the muscles are protected from exhaustion by the nerve cells failing first, the problems of industrial fatigue are almost wholly problems of fatigue in the nervous system. In the tired man fatigue is felt in the muscles, it is referred to them, but the fatigue is really that of the nervous system. "It is well known that a man apparently run to a standstill in a race may, upon some new excitement, run freshly again, under augmented stimulus from the central nervous system, initiated there perhaps in part along new paths." For every action a given rhythm of activity allows exact recovery after each act, and the heart, for example, beats incessantly for the life of a man without any accumulated fatigue. Complicated co-ordinations in the nervous system may by training become capable of maximum efficiency at a more rapid rhythm than was possible in the untrained state. "It is the problem of scientific management to discover in the interests of output and health of the workers what are the maximal efficiency rhythms of the various faculties of the human machine." This must be done for short spells, hours of shift, periods of sleep and holidays. Scientific management is illustrated by the following anecdote: Two officers at the front, for a friendly wager, competed in making equal lengths of trench, each with an equal squad of men. One let his men work as they pleased, but as hard as possible; the other divided his men into three sets, to work in rotation, each set digging their hardest for five minutes and then resting for ten, till their spell of labour came again. The latter team won easily.

The true sign of fatigue is diminished capacity; measurement of output, therefore, will give the most direct test. Since overstrain may not only reduce the capacity at the moment, but for long periods, it is plainly uneconomical to allow overstrain, and scientific management will see that the right kind of work is apportioned to the right individual. "Astonishing results, bringing advantages both to employers and employed, have been gained in other countries by the careful selection of individuals for particular tasks based not upon the impressions of foremen but upon the results of experiment." Unfortunately there is against the development of such scientific management the suspicion that any device for increasing output will be used for the profit of the employer rather than for the increased health and comfort of the workers.

"An important and early sign of fatigue in the nervous centres is a want of co-ordination and failure in the power of concentration." This may be shown objectively in an increased frequency of trifling accidents. The accumulated results of fatigue damage the general health and will be reflected in sickness returns, in returns of lost time, and in a sense of staleness among the workers—a feeling of being "done up" or "fair whacked." This feeling may result not only in lethargy and indifference, but in a craving for change and excitement, and may lead to indulgence in alcohol.

[1] Health of Munition Workers Committee. Memorandum (No. 7) on Industrial Fatigue and its Causes [Cd. 8213]. To be obtained through any bookseller. Price 1d.

A works manager worked hard 361 days out of 365, and looked worn. A skilled tool maker had had eight days' holiday, including one for a funeral, since the war began (fourteen months); he complained of the strain on his nerves. The official of a very large trade union said that overtime was excessive and the skilled workmen were becoming "nervy." These are representative examples of the reports gathered from the evidence collected by the Committee. Proper attention to the need for weekly rest would have prevented the reduction of output by such fatigue and staleness. The Minister for Munitions has accepted the Committee's recommendation concerning Sunday labour, and formulated the need for the Sunday rest throughout the controlled factories. It is remarkable that so far the Government arsenals, Woolwich and Enfield, do not seem to have carried out the instructions, and continue to work thirteen shifts in fourteen days. "Misguided efforts to stimulate workers to feverish activity in the supposed interests of the country are likely to be as damaging to the desired results as the cheers of partisans would be if they encouraged a long distance runner to a futile sprint early in his race."

Examples are given of the value of intelligent management. "At a large shell-making factory the men for the early months of war worked seven 12-hour day and seven 12 hour night shifts in the week. More recently Sunday work has been stopped (or at least every man has a weekly day of rest), and the men work from 6 a.m. to 7.30 p.m. with an hour and a half off for meals. These hours are long, but as a result of improvement in organization they now produce an increased number of shells from half the number of workers." At another large factory the men engaged in the heavy work of moulding were required by the management to rest fifteen minutes in every hour of work. The output was found actually to be increased. At another factory fifteen minutes' recreation for the girls in the open air at 11 a.m. increased the output. Educational authorities recognize that no class should last more than three-quarters of an hour, and that then the students should have a run round the playground. Nevertheless, factory girls are put to sit at a bench for stretches of four or five hours.

"Elevens" and "fours," an excellent custom among agricultural labourers, should be made compulsory in all factories. The objection is that it takes so long to empty the shops. But the shops should not be built to cover acres, but long and narrow so as to ensure good ventilation through a large surface of wall, then there would be no delay in emptying them into playgrounds which should be provided in every factory.

PENETRATING WOUNDS OF THE ABDOMEN.

IN the detailed report to the Medical Research Committee presented by Captain Fraser, R.A.M.C., and Captain Bates, R.A.M.C.(T), and printed upon an earlier page of this issue, will be found an account of the results of operation, or the abstention from operation, in a number of cases of penetrating wounds of the abdomen. It is needless to say that thousands of such cases have occurred during the course of the present war, and that they are of the greatest interest to the operating surgeon because their unfortunately high mortality may admit of material reduction. It is not to be doubted that such a reduction will follow the discovery and application of the methods of surgical treatment best designed to meet the requirements of each individual case, and the report gives abundant evidence of the importance of this principle. A second principle upon which stress must be laid is the importance of making a thorough examination of all the abdominal viscera before the operative procedure is decided upon in cases in which the possibility that several visceral injuries will have to be repaired cannot be excluded. For example, where the small intestine has been injured, the authors of the report emphasize the necessity for scrutinizing every portion of the small intestine and of the large in succession before any decision as to treatment is reached; details of the temporary and final methods of dealing with such injuries are given, and the progressive character of the bleeding that follows laceration of even the smaller mesenteric vessels is noted. It will be seen that the authors express a general preference for the performance of a lateral intestinal anastomosis in cases of multiple injuries of the small gut, for the reason that they find that resection of the injured tube is so frequently followed by distension and paralytic ileus in the proximal segment. It would be interesting to learn how the results of the method of dealing with these cases advocated a few months ago in this JOURNAL[1] by Captain (temporary) O. W. Richards, R.A.M.C., would compare with those obtained by the authors of this report. It will be remembered that Captain Richards advised the resection of "not only the injured portion, but also as much bowel above it as is likely to remain out of action and constitute a functional obstruction," a point to which Barker had previously called attention in relation to strangulated hernia.

According to Colonel Cuthbert Wallace, men shot through the abdomen die mainly from one of three causes—haemorrhage, peritonitis, or intestinal obstruction following peritonitis. Captains Fraser and Bates conclude that immediate laparotomy, particularly if haemorrhage is suspected, or laparotomy after the lapse of an hour or two, is indicated in the vast majority of cases of penetrating wounds of the abdomen. To combat the shock from which he is suffering the patient is stimulated by warmth and by the exhibition of pituitary extract before the operation. Every precaution is taken to minimize shock during the operation, and several pints of saline are given subcutaneously while it is in progress. The danger of post-operative intestinal obstruction is met in the manner already indicated. The third danger to which the patient is particularly exposed, that of peritonitis, is minimized by washing out the abdominal cavity in early cases with extensive soiling of the peritoneum, and in later cases, with or without evidence of peritonitis, by drainage through a single Keith's tube passed into the pouch of Douglas. For the rest, the post-operative treatment is carried out on the usual lines, special attention being paid to the administration of fluids by the rectum or by subcutaneous infusion.

What of the results of treatment on these lines? The authors of the report say that the surgeon "must be prepared for repeated most bitter disappointments, but when one comes to view a series of cases, the gains seem infinitely greater than the losses." A new method of dealing with the peritonitis and paralytic intestinal obstruction that prove fatal to many of these patients is developed in a paper by Captain Sampson Handley, R.A.M.C.(T.), which will also be found in this issue. He argues that in all probability many patients shot through the abdomen and suffering from the

[1] BRITISH MEDICAL JOURNAL, 1915, ii, 213.

consequent peritonitis die from the onset of intestinal obstruction rather than from the direct results of the peritoneal infection. He has found that such general peritonitis is rarely universal, and that it usually begins deep down in the pelvis and spreads upwards through the peritoneal cavity. He contends that so long as a patient with general peritonitis remains capable of active vomiting it must be assumed that the upper part of his small intestine, the stomach, and probably the transverse colon, are not paralysed, not yet having been reached by the peritoneal infection as it spreads upwards among the abdominal viscera. Hence he concludes that the patient's life may be saved, in spite of the extensive paralytic obstruction of the lower parts of the intestinal tube, by immediate operative interference. If the peritonitis remains confined to the pelvis, ileo-colostomy to the ascending colon with caecostomy are, he thinks, indicated; but in cases of so-called general peritonitis extending roughly up to the level of the umbilicus, jejuno-colostomy to the transverse colon and caecostomy. In all cases pelvic drainage must be provided. These operations provide an emergency alimentary canal consisting of stomach, jejunum, transverse and ascending colon, and caecum; and this canal will provide the patient with clean food and fluid that may tide him over the critical period of his illness and stop the spread of the general peritonitis that would have proved rapidly fatal had no such assistance to his resisting powers been provided. There is a thoroughness about Captain Handley's hypotheses and conclusions that renders them attractive and makes it desirable that they should be put to the test of further actual experience, as he himself suggests.

OFFICIAL RECOGNITION OF THE ENROLMENT SCHEME.

THE official statement of the War Office with regard to the enrolment of medical men for the military services, which has been widely published in the press and the full text of which will be found in the SUPPLEMENT for this week, affords a further and final recognition of the work of enrolment carried out by the three representative bodies of the medical profession — the Central Medical War Committee for England and Wales, the Scottish Medical Service Emergency Committee, and the Irish Medical War Committee. As the official statement points out, the real purpose of the enrolment scheme is to secure that those doctors are selected for military purposes who can best be spared at the particular date, and from the particular place, with due regard to the civil needs of the population, to the personal circumstances of the doctor, and to the requirements of His Majesty's Forces. The War Office has officially recognized, and now relies upon, the Central Medical War Committee and the corresponding committees in Scotland and Ireland. The official statement correctly uses the phrase "military services," for obviously the Royal Navy has an equal, if not a paramount, claim, but this has been so thoroughly recognized that up to the present the navy has, we believe, found no difficulty whatever in obtaining the medical officers needed. The appeal of the Medical War Committees has consequently been for the army, but any medical man who prefers to offer his services to the navy will not find any difficulty in so doing. The decision of the Central Medical War Committee, reported in the SUPPLEMENT, with regard to the proportion upon which the calling up should proceed will relieve the anxieties of those medical men who may have feared that calls might be made from too limited a roll. Experience shows that the calls are likely to be small in respect of the number of men required at any one time, and will only recur at intervals as the need arises. The demand on the medical profession will be gradual and can be easily met, but can only be quite efficiently met if all medical men of military age who have not yet enrolled will do so with one of the three committees. The trust now reposed in these committees by the military authorities will impel every patriotic member of the profession to enrol. By so acting he will do his share towards rendering it possible for the medical profession to meet both civilian and military needs without recourse to methods of compulsion.

WITH THE RUSSIAN RED CROSS.

IN the Norwegian daily paper *Tidens Tegn* for March 16th an enthusiastic account is given by Dr. C. Johannessen of the Red Cross in Russia, whence he has recently returned after a visit of four months. He spent three months at the front attached to Princess Kcenia Aleksandrowna's hospital and train service. He seems to have been exceptionally fortunate in securing this appointment, as apparently no other neutral surgeon was permitted to share in the medical and surgical work at the front. He entered Russia through Finland, travelling with a draft of wounded Russian soldiers released from Germany. In Petrograd he worked for a short time under Professor Oppel, who, when he had convinced himself of Dr. Johannessen's surgical attainments, helped him to reach the front. Here the staff of five English-speaking Russian nurses bridged the linguistic gap between Dr. Johannessen and his Russian patients. He was much impressed by the physique and equipment of the Russian soldiers; so well were they clothed that, among the 3,500 soldiers under his care, there was not a single case of frost-bite. The food was abundant and good, and even at the front the soldiers were able to take a bath once a week. The medical arrangements were also in other respects so satisfactory that there was no serious epidemic of any kind. He was greatly struck by the cordial, almost fraternal, relations between officers and men, and by the adaptability of the peasant soldier. When the first waves of German poison gas were approaching the Russian trenches, one of the soldiers called on his comrades to light fires in front of their trenches so that the oncoming gas would be carried upwards by the draught instead of descending into the trenches. As an example of the self-sacrificing efforts made by the various towns, Dr. Johannessen describes how, in the course of one month, hospitals with a total accommodation for 64,000 wounded were provided by Moscow alone. Since then this number has been more than doubled, and the town has provided forty ambulance trains in addition to other conveyances for the wounded. One of the most striking features in Russia was the calm and deliberate spirit in which everything was done. There was no disorderliness, no rowdiness, no drunkenness; the very sobriety of the nation was perhaps the truest sign of the unflinching spirit in which Russia was preparing to redeem the mistakes of the past.

PHYSIOLOGICAL TESTS FOR AVIATORS.

IN the BRITISH MEDICAL JOURNAL of March 11th a brief account of certain injuries and diseases of aviation was given, based on observations made by Staff Surgeon H. V. Wells, R.N., and Dr. G. Ferry. A study of the physiological methods that may be employed with advantage in the testing of would-be aviators has just been published in a Paris medical journal,[1] by Professor Camus and Dr. Nepper. They point out that, quite apart from the general physique and organic health of the candidates for aviation, attention should be paid to the promptitude and quality of the responses given by their nervous systems to the various stimuli they will receive in the course of

[1] *Paris médical*, 1916, vi. 290.

their work. It is essential, on the one hand, that they should respond without delay, so that tactile, auditory, and visual impressions may be expected quickly to lead to movements of adaptation or defence. On the other hand, it is equally important that the aviator should not be unduly at the mercy of his emotions, such as fear, excitement, nervousness, and the like. As every physiologist knows, reaction times and responses to different stimuli are quantities readily capable of exact measurement; the necessary apparatus is, indeed, the stock-in trade of psychological and psycho-physiological laboratories. Professor Camus and Dr. Nepper have accordingly used the well-known electric chronometer of d'Arsonval for determining the candidates' reaction times or latent periods on the receipt of visual, auditory, and tactile stimuli, the mean of ten separate determinations being taken as the figure in each case. A good candidate will have a latent period of about 0 19 second for visual stimuli and 0.14 to 0.15 second for tactile and auditory stimuli. The figures will be considerably larger in the case of unsuitable candidates—for example, 0.3, 0.27, and 0.27 second in one instance, 0.28, 0.2, and 0.22 second in another, to quote actual cases. The method of investigating the stability of a candidate's nervous system is different. Apparatus is rigged up to record on the familiar smoked drum the cardiac rhythm, the respiratory rhythm, and, by means of a finger placed in a pleihysmograph, any modifications that may take place in the peripheral vasomotor system; in addition, a record of any muscular tremor that may be present is made. While all these records are in progress, revolvers are fired, magnesium powder is flashed off, or cold cloths are dashed on to some exposed part of the candidate's skin. With a good candidate these violent external stimuli will produce little change in the tracings; a bad candidate will show cardiac, respiratory, or vasomotor irregularities due to excess of emotion at such alarums and excursions as these. It is clear that the man who is a bit slow in the uptake will come out badly in the first series of tests, while the tests of the second series should serve to detect and unmask the unduly nervous and excitable candidate. These novel methods of examining would-be aviators are still on their trial and have not yet reached finality in form, but the results they have yielded are said to be promising. It is undeniable that they appear to give numerical measurements of qualities that must be of importance to aviators, in place of the mere impressions as to the suitability or unsuitability of candidates that must at present influence the opinions of those who are responsible for the selection of likely fliers.

MANY NAMES FOR THE SAME THING.

WE doubt whether any members of the medical profession could be found who would dissent from the statement that the practice of bestowing a series of different names on a single substance of known chemical composition is from their point of view an unqualified nuisance, whatever advantages it may have from the point of view of manufacturing enterprise. Some, however, may be unaware of the extent and frequency of this practice, though instances will occur to every one, and a good many were given in the series of articles on the chemical constitution of certain proprietary drugs published in the JOURNAL at the end of 1914 and the beginning of 1915. One such instance was that of acetyl-salicylic acid, which is in the *British Pharmacopoeia*, 1914, under that name. It was introduced under the trade name aspirin by a German firm; other firms have applied the names acetysal, acetosalin, aletodin, saletin, salaretin, xaxa, and empirin to the same substance. Another example is the drug introduced under the trade name atoxyl, also by a German firm; it is sodium para-aminophenylarsonate, but in the *British Pharmaceutical Codex* it is given the shortened name, sodium aminarsonate. Trade names for this body are arsamin and soamin, but with regard to the latter it should be said that it is stated to contain five instead of four molecules of water of crystallization. Again, the drug which appears in the *British Pharmacopoeia*, 1914, under the name hexamine, a contraction of its chemical name, hexamethylenetetramine, was introduced under the trade name urotropine, and other firms applied to the same substance such names as aminoform, ammonio-formaldehyde, ammonaldehyde, cystamin, cystogen, formin, metramine, urisol, uritone, xametrin, and vesalvine. Other instances might easily be added from past history, and we fear that there is a risk of such a confusion arising in respect of the substance para-toluene-sodium-sulphochloramide, suggested as a wound antiseptic by Dr. Dakin and Professor Cohen; its clinical use has already met with considerable success, to which our columns have on more than one occasion borne witness. The theoretical basis of the work, full details of the preparation of the substance, and the early practical results of its use were published by the originators in the BRITISH MEDICAL JOURNAL of January 29th, 1916, p. 160. It was very desirable that the substance should be produced in commercial quantities, and we were therefore glad to learn that its manufacture had been undertaken by Messrs. Burroughs, Wellcome, and Co. In submitting samples of their preparation they informed us that the name chloramine, or chloramine-T, suggested by the scientific workers responsible for its introduction, had been found to clash with that of an American proprietary preparation, and that they proposed to apply the new name, tolamine, to the para-toluene-sodium-sulphochloramide made by them. In a notice of these samples published in the JOURNAL of February 19th, p. 289, we endeavoured, both in the title and in the text, to make it plain that tolamine was a new name used by Messrs. Burroughs, Wellcome, and Co. for the substance which Dr. Dakin and Professor Cohen had proposed to call chloramine-T. We acquiesced in the proposed use of this name in the hope that confusion might thereby be avoided, but this hope does not seem likely to be fulfilled. As Dr. Dakin and Professor Cohen, who carried out their researches for the Medical Research Committee, published full particulars of the mode of preparation of para-toluene-sodium-sulphochloramide it was open to any competent firm of manufacturing chemists to make the substance. We ought, perhaps, to have foreseen that this would happen. As a matter of fact, we shortly afterwards had occasion to mention (March 25th, p. 454) that another firm, Boots Pure Drug Company, had manufactured the substance, and were selling it under the name suggested by the originators, chloramine-T. We are told that other firms are manufacturing the substance, or propose to do so, and that the name chloramine-T suggested by its originators, which is free for all to use, appears likely to be generally adopted. Messrs. Burroughs, Wellcome, and Co., we are informed, have registered tolamine as a trade name, and the medical profession will understand that if they order para-toluene-sodium-sulphochloramide under the name tolamine, the proprietary preparation of this firm must be supplied. We quite admit that for many synthetic substances in common use it is essential to find some short convenient name when, as often happens, the scientific name which expresses its constitution is inconveniently long; obviously, para-toluene-sodium-sulphochloramide is a case in point, but Dr. Dakin and Professor Cohen furnished a short name for it, and, we understand, do not approve of the word "tolamine." While we think that the wishes of the discoverers ought to be respected, we only desire here to make our own position clear, which is that the system of various firms giving different proprietary names to the same substance is not only inconvenient to the medical profession by causing confusion, but is, in our judgement, undesirable on general scientific grounds.

AN ESTIMATE OF THE NUMBER OF DEATHS CAUSED BY ALCOHOL.

In the *Alliance Year Book for 1916*[1] Dr. Norman Porritt publishes an estimate of the number of deaths in England and Wales during the year 1913 directly or indirectly caused by the abuse of alcohol. Dr. Porritt has proceeded on the following lines: In the first place he sets out a number of causes of death to which the abuse of alcoholic beverages may be assumed, with more or less probability, to have directly contributed. This list includes, among others, cirrhosis of the liver, diseases of the heart, cance , tuberculosis, and epilepsy. The total deaths registered under each heading are multiplied by a factor varying from one-eleventh to unity and the products summed. The total is given as the direct alcoholic mortality. Under indirect mortality Dr. Porritt ranks a certain proportion of the deaths attributable to the consequences of venereal disease and more than one-sixth of the deaths under 5 years of age. In this way Dr. Porritt arrives at a grand total of 77,416 deaths. That in some of the diseases named by Dr. Porritt the abuse of alcohol is of direct etiological significance, and that in almost all it unfavourably affects the prognosis, are propositions no medical man is in the least likely to dispute. On the other hand, hardly any one will be prepared to regard Dr. Porritt's estimates of the proportions really attributable to alcoholism as much more than guesses. Thus he writes: "In 1913, in England and Wales, 1,700 persons between the ages of 25 and 65 died from diarrhoea and enteritis. In at least a sixth of these the fatal result would be due to alcohol." These and similar assertions may be true or false, but are evidently not within the pale of scientific discussion. Dr. Porritt thinks that if death certificates were confidential documents an adequate record of the causes of death would be obtained. There is force in his contention, but in the particular case under notice it is perhaps doubtful whether much would be gained unless a uniform system were introduced. The mere attribution of the death to the effects of alcoholism would, we think, be of little value owing to the wide individual divergences of opinion which must occur as to the relative importance of alcohol as a predisposing or determining cause in different diseases. If, however, it were possible to make a statement as to the habits of the deceased with regard to the use of alcohol in *all* cases, then an analysis of the returns might yield important information. As, however, the knowledge of the certifying practitioner with respect to the habits of his patient must often be imperfect, even these returns would be subject to considerable errors. In any case such an alteration in our system of certification raises many delicate questions which cannot be discussed now.

[1] *The Alliance Year Book and Temperance Reformer's Handbook for 1916*. Manchester: United Kingdom Alliance. 1916. (Price 1s.)

Medical Notes in Parliament.

The Budget.—So far as can be judged from the Chancellor of the Exchequer's budget statement on April 4th, the increases in taxation will not specially affect members of the medical profession in the pursuit of their calling except in respect of the increased license duty on motor cars and motor cycles, which in many districts have now become indispensable to medical practitioners. The rates for cars not exceeding 16 h.p. will be doubled, and above that trebled. On motor cycles the duty will be £2 2s. if under 4 h.p., and above that three-fourths of the duty chargeable on motor cars of like horse power. Medical men will, we presume, continue to pay half the duty in respect of a car kept for professional purposes. With regard to income tax, the rate on earned income is to be 2s. 3d. in the £ up to £500 a year instead of 2s. 1½d.; from £500 to £1,000 a year 2s. 6d. instead of 2s. 1½d. Thereafter the scale rises by stages to 5s. in the £ on earned incomes when the total income exceeds £2,500. On unearned income the new scale will begin at 3s. on incomes not exceeding £300, and will rise by stages of 6d. to 5s., which will be paid on incomes exceeding £2,000. On this, as on many other points, it will be necessary to await the full statement which will be contained in the white paper and the bill, and we propose to recur to the matter shortly. Meanwhile, it may be noted that the grievance with regard to income tax on military pay is so far met that Mr. McKenna stated specifically that income received as pay for service in the naval and military forces will not be subject to the additional rates of tax. The points which came in for most criticism in the short debate following Mr. McKenna's statement were the proposed taxes on railway tickets, on matches, and on mineral waters.

Notification Fees.—The Local Government (Emergency Provisions) Bill, introduced into the House of Commons by the President of the Local Government Board, carries out in Clause 5 the recommendation of the Retrenchment Committee (see JOURNAL, March 4th, p. 347 and p. 350) to the effect that the fee for the notification of infectious disease occurring in a practitioner's private practice should be reduced from 2s. 6d. to 1s., the fee hitherto paid for notifications of cases occurring in his practice as medical officer of any public body or institution. The same clause requires notification of any case of infectious disease occurring in any building, tent, van, shed, or similar structure in the occupation of His Majesty's Forces, or of any person employed by the Admiralty, the Army Council, or the Minister of Munitions, if it would have been the duty of the medical attendant to notify it if it had occurred elsewhere. The local authority is to pay the fee of 1s. to the medical attendant whether the case occurs in his private practice or otherwise, unless he be a medical officer or a practitioner who holds a commission in any of His Majesty's Forces, or is employed by the Admiralty or the Army Council, and is prohibited from engaging in private practice.

War.

Mesopotamia.—In reply to Mr. Malcolm, on March 30th, the Secretary of State for India said that the inquiry which was being conducted by Sir W. Vincent and General Bingley was confined to the medical and hospital arrangements of the Mesopotamian campaign. Mr. Chamberlain added that he assumed that it would embrace all matters relative to the sufficiency or otherwise of the provision made in India and Mesopotamia for medical personnel, stores, and appliances, and as to the organization of medical relief and the arrangements for dealing with the sick and wounded in the field, at the base, and in transit to the base. He had issued instructions that the Commission should fearlessly ascertain and assign the responsibility for the breakdown of relief, whether individuals or the system were to blame. The Viceroy had invited Mr. E. A. Ridsdale, Red Cross Commissioner, now *en route* from this country to Mesopotamia, to join the Commission as a member.

Antityphoid Inoculation.—The anxiety of some members with regard to the scruples of conscientious objectors extends to those who object to antityphoid inoculation. Mr. Anderson asked, on March 28th, whether recruits who objected to antityphoid inoculation would be allowed leave in the ordinary way, provided they produced evidence from the M.O.H. of the district they intended to visit stating that the neighbourhood was free from typhoid fever. Mr. Tennant replied that the necessity of preventing the introduction of enteric fever into military camps was paramount, and necessitated that leave should be granted sparingly to men who objected to inoculation. He did not think that the suggestion with regard to the M.O.H. provided sufficient safeguard that uninoculated men on leave would not bring back infection.

Royal Army Medical Corps.—Mr. Shirley Benn asked if young physicians and surgeons, recognized as modern practitioners who join the Royal Army Medical Corps, are made junior officers and have to take their orders from men who, whether clever or stupid, have received their promotions through length of service. Mr. Tennant: If my hon. friend could provide an

infallible criterion for distinguishing between clever and stupid people, and if he could secure its universal and willing acceptance by all the varied and numerous parties concerned, some beginning might be made to put in practice the Utopian system of his choice. In the meantime, the answer to his question is that in the army, as in most professions, the juniors take their orders from the seniors. Mr. S. Benn: Am I to understand that medical qualifications are not taken into consideration? Mr. Tennant: It depends, of course, on the officer's rank.

Tuberculous Soldiers and Sailors.—In reply to Mr. R. McNeill, on April 4th, the Financial Secretary to the War Office said that soldiers who became medically unfit for further service owing to tuberculosis were not sent to their homes when discharged from the army. Arrangements existed with the Insurance Commission by which those men who were insured under the Insurance Act were, if they desired, sent to sanatoriums. Similar arrangements existed with the Local Government Board for men who were not insured, sanatorium treatment being provided as a special privilege. Mr. Forster declined to accept the suggestion that soldiers and sailors suffering from tuberculous disease should be kept undischarged for a period of not less than six months in hospitals specially reserved for them.

Insurance Premiums.—The Financial Secretary to the War Office stated, on April 4th, that shortly after the outbreak of war negotiations were opened with insurance companies with reference to life policy holders on military service in France. The result was that in the case of officers insured before the war extra premium was generally foregone or charged at a low rate, but this arrangement did not apply to fresh insurances.

Army Pensions.—In reply to Mr. Godfrey Collins, the Financial Secretary to the War Office stated, on March 29th, that it was roughly estimated that the cost of pensions arising out of the present war for the year 1915–16 would amount to £2,600,000, and for the year 1916–17, assuming the war to last throughout the year, to £10,000,000. There was, in addition, a charge of nearly £5,000,000 for pre-war pensions.

Wounded Soldiers Discharged.—Mr. Tennant has stated that a soldier unlikely to be again fit for military service was retained in the military hospital as a free patient after discharge from the army if he required further hospital treatment.

Sanatogen.—Sir C. Kinloch-Cooke asked the President of the Board of Trade, on March 30th, to explain the conditions under which the Sanatogen Company was permitted to trade in this country; and whether, in view of the increasing cost of milk, and seeing that in the district in which the sanatogen factory was situated there was a demand for milk owing to the increased influx of population engaged in munition and dockyard work, and that milk was largely used for the manufacture of sanatogen, he would consider the advisability of winding up the company and so free quantities of milk for consumption. Mr. Runciman said that the business of the Sanatogen Company was being carried on in this country under supervision. The Advisory Committee appointed under the Trading with the Enemy Amendment Act, 1916, already had the case under consideration, and inquiries were being made with regard to the points referred to. In reply to further questions, Mr. Runciman said that pending the receipt of the committee's report he did not think it advisable to take any further steps.

THE British Fire Prevention Committee (8, Waterloo Place, Pall Mall, S.W.) has prepared a small placard (No. 28) setting out the fire precautions which should be taken for working parties and voluntary aid organizations for war work.

A DEMONSTRATION of a life-saving waistcoat was given recently in the swimming baths at the Y.M.C.A. head quarters in London. It consists of two superimposed garments, the inner consisting of a single thickness of waterproof material and the outer of two such thicknesses with a layer of kapok—a form of short-stapled cotton-wool—between them. On sudden immersion the volume of air between the two waistcoats is forced by the water into the spaces in the upper part of the garment, where it is entrapped by the airproof and watertight fabric, thereby enabling the wearer to keep his head above water. Should any of the air escape owing to damage of the material, provision has been made for ensuring reserves of buoyancy by means of the kapok and the air enclosed with it between the two outer linings. Various tests were made on the occasion referred to, and the waistcoat acquitted itself quite satisfactorily, although a demonstration in a swimming bath scarcely affords a criterion as to what would happen at sea. One advantage of the "Ever-ready" waistcoat, as it is called by the makers, the Life-saving Devices Syndicate, Basildon House, Moorgate Street, London, E.C., is that it needs no inflation on emergency; it is worn continuously, adding somewhat to the bulk of the wearer, but not otherwise inconveniencing him.

THE WAR.

AMPUTATIONS AND AMPUTATION STUMPS.

THE War Office has issued a little pamphlet entitled *Memorandum on Amputations and Amputation Stumps.** It brings together, for the benefit of medical officers serving in military hospitals at home and abroad, the experience gained by the surgeons at home who have been engaged in the after-treatment of amputation cases, more especially with regard to the fitting of artificial limbs. The notes, we gather, are founded upon the experience at the special hospital at Roehampton. The number of cases sent to it for artificial limbs is large, so that the opportunity for study and observation has been unusually favourable, and the conclusions reached undoubtedly deserve, as the introduction to the memorandum says, "the careful consideration of all operating surgeons." It is stated that of the cases which, as far as the condition of the wound goes, are ready for fitting, the stumps in many are more or less objectionable from the limb-makers' point of view.

Amputations.

The first section of the memorandum deals with amputations, and it is pointed out that while the site, and often the method, of an amputation is mainly determined by the injury, in many cases the surgeon is able to use his discretion not only in the matter of the immediate surgical condition, but also with regard to the future usefulness of the stump. As an example, it is said that while, as a general rule, the amputation stump should be made as long as possible, yet the longest is not always the most useful to the patient or the best for the fitting of an artificial limb. Amputation through a joint (below the shoulder or hip) leaves no room for the fitting of a joint at its proper level in the artificial limb, and it may therefore often be better to amputate just above a joint rather than through it, unless, of course, a still lower site is available. "Guillotine" amputation—that is, straight through the limb, or circular without flaps—is an excellent procedure in suitable cases, in order to secure the freest possible drainage with the least sacrifice of tissues, but it must be followed by the proper after-treatment—namely, secondary amputation as soon as the wound is clean. Cases in which these open stumps have been allowed to heal by granulation, or treated by skin grafting, have in some instances given results which have been extremely unsatisfactory. If the bone cannot be well covered eventually it is better to re-amputate than to allow the flaps to become drawn in, adherent, and distorted in the process of cicatrization.

These general principles are illustrated in paragraphs dealing with amputations at various levels in the upper and lower extremity. With regard to amputation through the leg, the fact is emphasized that kneeling stumps are extremely undesirable at the present day, and that therefore all stumps below the knee should be kept straight in extension and not allowed to become contracted. The best amputation through the hip-joint is said to be that by an anterior racquet, tying the main vessels in the first incision. To this section there is a note to the effect that a case of amputation has not yet been met with at Roehampton, either in the upper or in the lower extremity, to which it was not possible to fit an artificial limb.

Amputation Stumps.

In the second section, on amputation stumps, it said that from the prosthetic point of view the chief requirements of a good stump are (1) a good covering for the bone; (2) sound healing; (3) consolidation; (4) painlessness; (5) freedom of movement. It is pointed out that consolidation of the soft parts continues for several months; if a bucket limb is applied prematurely it soon becomes loose and ill-fitting from shrinkage of the stump, and, as a general rule, four months should elapse from the date of amputation before any attempt is made to fit an artificial limb. During this period consolidation may be hastened, and the condition of the stump much improved by firm bandaging. The conditions which prevent or delay the fitting of an artificial limb are enumerated as (1) sinuses, (2) painful stumps, (3) unsound scars, and (4) contracture in the neighbourhood of the joint immediately above the amputation. With regard to painful stumps, it is said that

* March, 1916. 40, Misc., 1520.

localized pain on pressure is nearly always due to a bulbous nerve-end near the end of the stump, but in some cases the nerve end is spread out and adherent to the bone or to the scar. As painful nerve-ends are not always evident to the patient until pain, which may be intolerable, is elicited by the pressure of the bucket, they should be sought for by the surgeon and removed before the artificial limb is fitted. In a note on the great frequency of painful bulbous nerve-ends the advice is given that the principal nerves should always be identified and cut short at the primary amputation. Diffused tenderness, on the other hand, is, except in recent stumps, usually due to periostitis or necrosis, the latter, of course, calling for operation. It is added that pain, either localized or diffuse, is sometimes due to bony spicules projecting from the end of the bone. Such osteophytic outgrowths are commonest in stumps about the middle of the thigh, and may have to be removed before an artificial limb can be worn. Speaking generally, it is said that in all amputations the object should be to get a linear scar placed where it will not be subjected to pressure or irritation by the artificial limb.

The memorandum, though short, will be found not only very helpful but very readable, for it deals primarily with general principles, and their application to particular conditions is always adequately explained.

CASUALTIES IN THE MEDICAL SERVICES.

ON March 28th it was announced that, in the published lists of casualties, the seat of war in which the casualty occurred, and the battalion in which the officer or man was serving, would no longer be stated, for military reasons. Relatives were also asked not to publish these facts in obituary notices. This information, therefore, can no longer be given.

ARMY.

Died on Service.

Captain Frederick Francis German, R.A.M.C. (temporary), died at his residence, Bedford House, Sandy Road, Seaforth, Liverpool, on March 30th, aged 55. He was educated at Liverpool, and after taking the L.R.C.P. and L.R.C.S. at Edinburgh in 1881 he acted as junior house-surgeon of the Stanley Hospital, Liverpool, house-surgeon of West Bromwich District Hospital, and acting assistant-surgeon of His Majesty's prison, Liverpool. He then went into practice at Seaforth, where he took much interest in public life. In 1895 he became a member of the local council, and three years later its chairman, a position which he subsequently resigned to take up the post of medical officer of the Waterloo-with-Seaforth urban district. He was also honorary physician to the Waterloo and District Hospital, surgeon to the troops at Seaforth, and to the Lancashire county police, and medical examiner to the National Society for the Prevention of Cruelty to Children. He was a Captain in the Lancashire Artillery Volunteers, but resigned his commission in 1907, and had lately joined the R.A.M.C. as a temporary Captain. He was a prominent Freemason, being a P.Pr.G.W. of West Lancashire and a P.M. of the Skelmersdale Lodge No. 1380. In politics he was a Conservative. He leaves a widow, daughter, and son, the latter being a staff-sergeant in the Royal Field Artillery.

Wounded.

Captain R. H. Condy, R.A.M.C. (temporary).
Captain Gross, R.A.M.C. (temporary).
Captain A. Robb, R.A.M.C.(T.F.)
Lieutenant J. Young, R.A.M.C. (temporary).

DEATHS AMONG SONS OF MEDICAL MEN.

Carter, Arthur Rowland, Sergeant Rhodesian Regiment, of Odzi Rapids Farm, South Rhodesia, eldest son of the late Deputy Surgeon Rowland Wimburn Carter, A.M.S., killed in action in February, aged 35.

Childe, Charles M., Captain Gloucester Regiment, eldest son of the late Lieutenant-Colonel L. F. Childe, I.M.S., killed recently. His commission as Captain was dated February 13th, 1915.

Kenyon, Charles Wilton, Second Lieutenant Royal Sussex Regiment, attached to a trench mortar battery, son of Dr. G. H. Kenyon, of Horsham, Sussex, killed in action on March 16th, aged 22. He was born at Horton Pagnell, in Yorkshire, in 1893, educated at Reigate and at Horsham Grammar Schools, and at Exeter College, Oxford, where he was in the O.T.C. His commission was dated November 13th, 1914.

King, Maurice Edmund, Second Lieutenant Middlesex Regiment, third son of the late Dr. Henry W. King, of Northwood, Middlesex, killed recently, aged 19. He was educated at the Leas, Hoylake, and at St. Edward's School, Oxford, and had just completed his first year as a medical student at University College Hospital when the war began. He was in the Rugby fifteen both of his school and hospital. His commission was dated February 23rd, 1915.

Bruce, Vincent Connell, Lieutenant Gordon Highlanders, second surviving son of the late Dr. Alexander Bruce, of Edinburgh, missing since March 26th, and believed killed, aged 27. He was educated at New College, Oxford, and at Edinburgh University, where he took the degree of LL.B. just before the war. He enlisted at the beginning of the war in the 15th Royal Scots and got his commission as second lieutenant in the 13th Battalion of the same regiment on November 13th, 1914, subsequently transferring to the Gordon Highlanders. On attaining his majority he succeeded to the estates of Inverquhomery and Longside in Aberdeenshire.

MEDICAL STUDENT.

Dorman, Thomas Robert Hobart, Lieutenant 2nd Battalion Royal Munster Fusiliers, who is reported missing since March 1st, 1916, is the son of the late Major Thomas Dorman, R.A.M.C., of Kinsale, co. Cork. He was a third year medical student at Trinity College, Dublin, and joined the army in March, 1915.

NOTES.

IN succession to Sir Arthur Lawley, who has accepted another appointment, the Earl of Donoughmore has been appointed British Red Cross Commissioner in France to work under Sir Arthur Sloggett, D.G., A.M.S., and Chief Commissioner in France for the British Red Cross Society and the Order of St. John.

HONOURS.

On March 30th a long list of honours was published: six V.C.'s, twelve D.S.O.'s, seventy Military Crosses, and 203 awards of the Distinguished Conduct Medal. At the same time a number of decorations, conferred by the President of the French Republic, were gazetted. Quartermaster and honorary Lieutenant E. Lyall, R.A.M.C.(T.F.), received the D.S.O.; and Captain B. Grellier (S.R.), temporary Captains L. D. Saunders and H. V. White, and temporary Lieutenant J. A. Harper, all of the R.A.M.C., got the Military Cross.

D.S.O.

Quartermaster and honorary Lieutenant Edward Lyall, 2nd Northumbrian Field Ambulance, R.A.M.C.(T.F.), (attached 185th Tunnelling Company, R.E.). For conspicuous gallantry and devotion to duty. When a large camouflet was blown in by the enemy he hurried through a flooded gallery in the dark and under heavy fire went for proto apparatus. Finding all the proto apparatus already in use, he hurried on and, although in an exhausted state, descended a shaft without any apparatus, assisted in the rescue of an officer, and then went further, rendered aid to two men, and made a most gallant effort to save two officers.

Military Cross.

Captain Bernard Grellier, R.A.M.C. (attached 10th Royal Welsh Fusiliers). For conspicuous gallantry and devotion to duty during operations when tending the wounded under heavy shell fire. He helped to dig out wounded men who were buried.

Temporary Captain Leonard Douglas Saunders, R.A.M.C. (attached 10th Notts and Derby Regiment). For conspicuous gallantry and devotion to duty. He tended the wounded under heavy fire, and finally evacuated them all with great skill and care. His clothing was torn by fragments of shell, and he was at work for forty-eight hours without a rest. This is the third time he has displayed great coolness and devotion to duty.

Temporary Captain Harry Vere White, M.D., R.A.M.C. (attached 7th Lincs Regiment). For conspicuous gallantry and devotion to duty during operations when tending the wounded. His dressing station was repeatedly hit by shells, and he himself was severely knocked about several times, but for thirty-six hours he stuck to his work.

Temporary Lieutenant John Alexander Harper, M.B., 52nd Field Ambulance, R.A.M.C. For conspicuous gallantry when leading stretcher-bearers during operations. On one occasion, when three of his bearers were wounded, he went alone, under heavy shell fire, to the aid post.

Distinguished Conduct Medal.

Sergeant J. W. Cherry, R.A.M.C.(T.F.), 1/3rd Northumbrian Field Ambulance.
Sergeant W. J. Currie, R.A.M.C., 59th Field Ambulance.
Corporal D. H. Molyneux, R.A.M.C., 53rd Field Ambulance.
Private J. J. Filton, R.A.M.C., 59th Field Ambulance.
Private C. M. T. Sheriff, A.S.C., attached 53rd Field Ambulance.

Legion of Honour: Grand Officer.

Surgeon-General Sir A. T. Sloggett, K.C.B., A.M.S. (substituted for the Cross of Commander, the award of which was gazetted on November 8th, 1915).

Croix de Guerre.

Lieutenant-Colonel J. Mill, R.A.M.C.(T.F.).
Captain J. A. Cullum, Canadian A.M.C.
Captain G. H. R. Gibson, Canadian A.M.C.
Captain E. D. Gairdner, R.A.M.C.(T.F.).

A list of naval officers mentioned in dispatches, by Rear Admiral Sir Dudley de Chair, for good service in the patrol cruisers, includes the name of Staff Surgeon Robert Bernard Scribner, R.N.

THE RICHMOND HOME FOR HELPLESS MEN.

The Star and Garter Home at Richmond for incurably helpless soldiers and sailors has now provision for 65, and the number already admitted is 49. A lift to the garden in which beds can be taken out on to the terrace will, it is hoped, be completed by the end of the month. The consulting staff is as follows: Consulting physician, Sir David Ferrier, F.R.S.; visiting physician, Dr. S. A. Kinnier Wilson, F.R.C.P.; consulting surgeon, Mr. Wilfred Trotter, M.S., F.R.C.S.; consulting urologist, Mr. J. Thomson Walker, M.B., F.R.C.S.; consulting ophthalmic surgeon, Dr. A. C. Hudson, F.R.C.S.; honorary dentist, Mr. Donald Campbell. The association called the British Women's Hospital is collecting £65,000 for the new buildings, but there is as yet no endowment.

MEDICAL OFFICERS WANTED.

3/3rd H.C. Field Ambulance, R.A.M.C.(T.).

Two or three vacancies exist for medical officers. Those desirous of joining this unit should make immediate application to the C.O. at the head quarters, "Trenches," Redhill. (Phone 300 Redhill.)

England and Wales.

MANCHESTER INFECTIOUS HOSPITALS.

EXTENSION schemes in connexion with the Infectious Disease Hospitals of the Manchester Corporation are now almost completed. The accommodation at the Monsall Fever Hospital has often been taxed to the utmost, and not infrequently cases have had to be refused. Five new blocks have now been added, four containing twenty-four beds each, with small observation wards and wards for special isolation cases; the fifth block provides extra nurses' accommodation. Additions have also been made to the laundry, and a shed for the motor ambulance has been built. Altogether there will be additional accommodation for 112 patients, and it is intended that in future all ordinary cases of infectious disease shall be taken to Monsall, so that the Baguley Hospital may be free for tuberculosis cases. The extensions at Baguley provide 100 beds for men and 52 for women. The new wards all face south and are open to the air above the windows, protection from storms being by means of inclined weather boards; on the north aspect there is protection for the lower story by a projecting balcony and for the upper story by the roof which is carried forward. A new dispensary, a dental room and a laboratory, and a new recreation and dining room have also been provided.

INSPECTION OF LYING-IN HOMES IN LONDON.

At the meeting of the London County Council on April 4th a long debate took place on the proposed delegation to the metropolitan borough councils of power to inspect lying-in homes under the provisions of Part IV of the London County Council (General Powers) Act, 1915. It was reported that since registration became compulsory under this Act 138 applications for registration of lying-in homes had been received, nearly one-third being for homes in Wandsworth and St. Marylebone. The result of such preliminary inspections as had already been made showed that the issues involved related almost entirely to the structural or sanitary fitness of the premises, therefore it was thought that the work was one for the Public Health Committee, and that the inspection should be carried out under the direction of the medical officer. Two of the borough councils—Bermondsey and Camberwell—stated that they were not prepared to undertake inspection; the remainder very generally stated that they could carry out the inspection with their existing public health staff without incurring additional expense. Most of the charitable and social welfare organizations strongly deprecated delegation of its powers by the Council, and eventually it was agreed that the Council itself should proceed with the work of inspection, the inspection to be undertaken by the Council's medical officer of health.

Scotland.

AT a meeting of the directors of the Royal Blind Asylum and School, Edinburgh, on March 27th, the chairman said that the proposal to use Newington House as a residence for blinded soldiers had aroused great patriotic interest throughout Scotland. It was felt that it was very much better that men who suffered this misfortune should live and work among their own people.

MAIMED SOLDIERS AND SAILORS.

The proposal to establish in the West of Scotland a hospital for soldiers and sailors who have lost limbs took definite shape at a meeting in Glasgow on March 29th. Subscriptions amounting to over £20,000 have been received, and Erskine House having been placed at the disposal of the promoters by Mr. Thomson Aikman, it is hoped that the committee will be in a position to receive patients within a few weeks. Lord Newlands, in moving a resolution appointing a committee, said that the credit for having initiated a movement for the benefit of soldiers and sailors who had lost their limbs was, so far as Scotland was concerned, due to Lady Issobel Douglas-Home, who started the Edenhall Hostel, Berwickshire, where valuable practical experience had already been gained. Sir William Macewen, in giving an account of the movement from its inception, said that notwithstanding the excellent work done at the Edenhall Hostel and at the Roehampton Hospital, it was apparent that there was abundant room for the establishment of another hospital to receive and treat men who had lost their limbs, or who had faulty use of their injured limbs after their discharge from the general hospitals, and to fit the limbless with artificial limbs and teach them to use them. Opportunity would be taken while the men were in hospital to inquire into their circumstances, and to help them to acquire knowledge, physical and mental, which would aid them in their future occupation. They would be taught to employ their spare time in useful and remunerative work, and those of dexterous hand and intelligent mind might be turned into artificial limb makers. Every effort would be made to fit them to earn their own living, and communications would be established with county representatives and with industrial firms, so that they might be distributed wherever suitable work could be obtained. The hospital is to be known as the Princess Louise Scottish Hospital for Limbless Soldiers and Sailors. Further donations will be received by the Lord Provost of Glasgow.

Ireland.

THE King has appointed Mr. Charles Yelverton Pearson, M.D., F.R.C.S., Professor of Surgery in University College, Cork, to be one of H.M. Honorary Surgeons in Ireland, in the room of the late Sir Charles Bent Ball, M.D.

The action in which Dr. Charles Ronayne, Youghal, claimed damages from Mr. Denis Doyle, U.D.C., for libel, was concluded at the Cork Assizes on March 28th. The alleged libel consisted of statements to the effect that plaintiff, who was dispensary doctor of Youghal, was incompetent and incapable of performing his duties. The defendant alleged that Dr. Ronayne was deaf, and in the interest of the sick poor he desired that he should retire on full pension. The jury found for the plaintiff in the sum of £100 and costs.

At a meeting of the Finance and General Purposes Committee of the Dublin Castle Red Cross Hospital it was reported that there were at present 126 wounded men in the hospital, and that since its opening 1,386 non-commissioned officers and men had been treated in the wards. The resident medical superintendent (Dr. W. K. Carew) reported that a new ward, containing ten beds, had now been fully furnished and equipped, so that 260 beds were available. An appeal is made for gifts of vegetables, potatoes, rhubarb, jam, cigarettes, tobacco, and slippers. A letter was read from the Belgian Consulate expressing thanks for the facilities placed at the disposal of Colonel Collyns and Dr. Molder for the purpose of examining Belgian invalided soldiers.

At the Ballinrobe Quarter Sessions Dr. Hawkshaw claimed from the local board of guardians £3 3s. for duty performed for three days as locumtenent for Dr. Corcoran. The guardians were willing to pay the amount, but the Local Government Board insisted that the usual fee for three consecutive days was £2 2s. The doctor's demand was based on the scale fixed by the Mayo branch of the Irish Medical Officers' Association, and Judge Doyle gave a decree for the full amount, holding that it was reasonable.

Canada.

SUMMER COURSES IN MEDICINE.

IN view of the need for military medical officers, the medical colleges of Canada have decided to give special summer courses this year, so that fifth-year students may graduate at the end of 1916 instead of in the spring of 1917. Some months ago the students requested that such a course might be given, and at first the faculties of medicine were somewhat averse to crowding the work of the final year into a six months' course. The matter was placed before the medical faculties in a letter from the military authorities, asking if such courses could be given provided it could be shown that the military necessity existed for such action; when later it was indicated that this necessity did exist, the universities at once expressed their willingness to accede to the request. The Universities of Toronto, Queen's, and McGill have already announced such courses for this year, and it is probable that other medical colleges will do the same. This means, of course, a period of fifteen months of continuous study for the student and for the teacher continuous teaching for a period of twenty-three months, since another session of eight months must be entered upon after the production of the present final year men. A short vacation will be given during the hot part of the summer. The students will enlist for service immediately after graduation.

CANADIAN MILITARY HOSPITALS COMMISSION.

The first *Bulletin* of the Military Hospitals Commission contains a full account of the purpose and work of the Commission and its co-operating associations, with a statement of the regulations governing pay, subsistence allowance, marriage, and other matters concerning the members of the Canadian Expeditionary Force. The Commission was formed by Order in Council dated June 30th, 1915, for the purpose of providing convalescent homes and medical treatment for returned invalided and wounded members of the force. Shortly afterwards the benefit of such treatment was extended to men who had enlisted but had not yet left Canada, and later the powers of the Commission were extended to the vocational re-education of those soldiers who through disability were unable to resume their former occupations. This phase of the work was placed in the hands of provincial commissions, which in turn elected local committees. Voluntary welcome and aid committees have also been formed in numerous districts, some of which render financial assistance to the men and their families. Convalescent homes have been opened at Sydney, Nova Scotia; St. John, New Brunswick; Quebec, Montreal (3), and St. Agathe des Monts, in the province of Quebec; Kingston (2), Toronto (2), Hamilton (2), Ottawa, London, and Port Arthur, in the province of Ontario; Winnipeg, Manitoba; Calgary, Alberta; Regina, Saskatchewan; and Esquimalt, British Columbia. At the present time there are about 1,200 men at these various homes. Upon examination by the Medical Board at the discharge dépôt the men are classified as follows:

Class 1.—Men for immediate discharge without pension:

(*a*) Unfit for overseas service, but capable to take up their previous civilian occupation.

(*b*) Disability not the result of service or involving claim as the result of or aggravation by service.

Class 2.—Men whose condition may be benefited by further medical treatment or rest in a convalescent home, hospital, or sanitarium.

Class 3.—Men having a permanent disability which would not be benefited by further medical treatment (such disability due to or aggravated by service) and whose cases will immediately be considered by the Pensions Board with a view to pension.

Before leaving the discharge dépôt the men are provided with suitable clothing, and are given a sum of money sufficient for immediate needs (not more than 10 dollars); the remainder of the money to which the man is entitled is forwarded to the paymaster of the district to which he is going. The rate of pay for a private is 1 dollar a day, with 10 cents field allowance; the subsistence is from 60 to 85 cents a day.

The functional and vocational re-education of disabled men is the most difficult branch of the work of the Commission. The secretary is Mr. T. B. Kidner, who has had a good deal of experience in such work both in England and Canada. The establishment of schools has been commenced in connexion with the convalescent homes, and preliminary instruction is given to the men in general education and recreative manual work. Such classes will be open to all the men at the convalescent homes. The Commission is conferring with the provincial governments with a view to the formation of a definite land settlement scheme, as it is expected that a considerable number of men will be anxious to take up land rather than return to their former occupations.

The Commission has agreed to recognize the British and other allied army and navy reservists who have left Canada during the period of the war for naval service. These men will be treated exactly as members of the Canadian Expeditionary Force, and will be given free treatment in a convalescent home if they require it.

Correspondence.

ARMY STANDARDS OF VISION.

SIR,—In a note on "The Relation of the Eyes to Rifle Shooting" in the JOURNAL of April 1st the statement occurs: "The army standard of vision is not high, and many soldiers require glasses to enable them to shoot with any degree of accuracy." We assume that the present British army standard of vision for recruits is referred to, and as a great deal of misunderstanding seems to be prevalent in regard to this point, we feel that it is very important that the facts should be made widely known. The present British army standard for general service requires vision of $\frac{6}{24}$ at least in each eye, or $\frac{6}{24}$ in the right and $\frac{6}{60}$ in the left *without glasses*. In the armies of France, Italy, Germany and Austria the visual standards very closely resemble each other while differing fundamentally from our own. They require for combatant service vision of about $\frac{6}{12}$ at least in the better eye *with glasses* (if necessary), which, if concave, may not exceed 6 to 7 dioptres in strength. To the uninitiated it might appear as if the British standard were lower than the others, but a moment's consideration will show that it is, on the contrary, by far the highest. The vision of a man who has 6 dioptres of myopia, even if his sight with glasses is excellent, is very seldom more and is often less than $\frac{6}{60}$ without glasses. Conversely, vision of $\frac{6}{24}$ corresponds on the average to a myopia of about 2.5 dioptres. The true comparison is therefore between the British $\frac{6}{24}$ and the Continental $\frac{6}{60}$ or the British 2.5 dioptres of myopia and the Continental 6 dioptres.

In respect of target shooting, it has been shown by various Continental writers that the best results are obtained by the soldiers who have the best vision, whether obtained with the aid of correcting glasses or not.—We are, etc.,

JAMES V. PATERSON, F.R.C.S.Edin.,
Ophthalmic Surgeon, Royal Infirmary;
H. M. TRAQUAIR, F.R.C.S.Edin.,
Assistant Ophthalmic Surgeon, Royal Infirmary.

Edinburgh, April 3rd.

Obituary.

JOHN T. LEON, M.D.LOND., M.B., B.Sc., D.P.H.CAMB.;

CAPTAIN R.A.M.C.(T.); HONORARY ASSISTANT PHYSICIAN, ROYAL PORTSMOUTH AND GOSPORT HOSPITAL; S.S.O. PORTSMOUTH COMMAND.

DR. JOHN T. LEON, the esteemed Chairman of the Portsmouth Division of the Southern Branch of the British Medical Association, died in the afternoon of March 31st, aged 50, from cerebro-spinal fever. He was almost certainly infected by a patient who coughed in his face during swabbing of the throat, and thus fell a martyr to his devotion to duty. Throughout his illness he was attended by his friends, Lieutenant-Colonel Routh and Major Ridout, and his brother-in-law, Dr. Luff of St. Mary's Hospital, saw him frequently in consultation. Dr. Leon's commission as Captain R.A.M.C.(T.F.), attached to the 5th Southern General Hospital, was dated July 21st, 1908. When on duty at the Alexandra Hospital, Cosham, he undertook much special work of high value, including the bacteriology of the instructive series of cases reported in the JOURNAL of February 26th, p. 307, in Captain Culpin's article on "The diagnosis of abortive cerebro-spinal meningitis."

Dr. Leon was educated at Clifton, and afterwards in Germany. He then entered University College, London, where he was Tufnell Scholar in 1885, and in 1887 he graduated B.Sc. in the University of London. In 1890 he was appointed assistant lecturer on physics and demonstrator of chemistry in St. Mary's Hospital Medical School. After holding those appointments for three years he began the study of medicine at St. Mary's, where he had a distinguished career. He became M.R.C.S. and L.R.C.P. in 1895, and graduated M.B.Lond. in 1896 and M.D. in 1899. After qualifying he was appointed on plague duty in India, where he did useful work in collaboration with Dr. Haffkine. Subsequently he served throughout the South African war, and was for the greater part of the time attached to No. 8 General Hospital at Bloemfontein. On his return from South Africa he settled in practice at Southsea, where he soon gained a leading position. He took the D.P.H. of Cambridge in 1897, and had acted as deputy to the M.O.H., Dr. Mearns Fraser, during temporary absences. Dr. Leon had been for a long time actively associated with the Royal Portsmouth Hospital, and at the time of his death was senior assistant physician. He was a Fellow of the Royal Society of Medicine, and vice-president of the Section for the Study of Disease in Children. In 1896 he contributed to this JOURNAL a note "On the relative opacity of calculi to x rays," illustrated by skiagrams of oxalate, phosphate, triple phosphate and uric acid calculi. He was keenly interested in social questions, and amongst other philanthropic work he acted as honorary secretary of the local branch of the Victoria Nursing Association. He was a brave man, who worked unsparingly for his country, and in him the medical profession has lost a distinguished physician and an able bacteriologist. Captain Leon leaves a widow and two young children, with whom much sympathy is felt.

MANY naval officers and St. Bartholomew's men of the early Eighties will hear with regret of the death of CHARLES STRICKLAND, which occurred after nine months' illness borne with great patience. He entered the medical profession rather later than most of his contemporaries, as he had been obliged to live for some time in South Africa on account of pulmonary tuberculosis, the disease which recurred last year. He took the diploma of L.R.C.P.Lond. in 1885, and that of L.R.C.S.Edin. in the following year. Strickland had a happy disposition, thoroughly enjoyed his life, and his genial nature made him a social success both at the hospital and in the services. When the war broke out he was fleet surgeon at the Royal Marine Light Infantry Barracks, Forton. Soon after this he was placed on the retired list on account of age, but he remained at this post until ill health necessitated sanatorium treatment. After an unsuccessful trial of this régime he settled down with his sister in a house in Southsea which he had prepared and looked forward to as his home on retirement; there he died somewhat suddenly on March 25th at the age of 56. The funeral, a naval one, took place on March 31st at the Highland Road Cemetery, Southsea.

Universities and Colleges.

UNIVERSITY OF LONDON.

THE following candidates have been approved at the examinations indicated:

SECOND M.B. (*Part I.*).—J. C. Braithwaite, W. M. Brown, M. W. B. Bulman, L. Burvill-Holmes, ‡E. E. Carter, F. Cavers, Alix Jeanne Churchill, H. Cohen, H. S. Cohen, M. Cohen, S. M. Cohen, Florence E. Coombes, D. C. Corry, C. K. Cullen, Beryl Dyer, E. S. Etheridge, F. Fanning, J. O'F. Fletcher, R. E. Ford, R. S. Foss, D. H. Geffen, E. E. D. Gray, R. H. Greaves, Dorothy M. Greig, Hilda T. Haggett, Edith M. Hall, Joan M. R. Harris, Eleanor Harse, H. L. Heimann, C. L. Hewer, G. R. Hull, G. Hume, R. C. B. Ledlie, J. N. Leitch, H. S. Le Marquand, H. T. Levieux, Gdal-Leizer Levin, ‡H. J. Levy, W. E. Lloyd, S. F. Mahmood, C. D. Maitland, Ida C. Mann, M. Marcus, G. Massie, Kathleen H. Matthews, Anna Miller, R. M. H. Newbery, Sybil G. Overton, J. P. Padshah, W. W. Payne, R. E. Pleasance, R. W. Revell, W. A. Richards, O. W. Roberts, S. Rosenschein, C. H. St. John, Ruth M. Scutt, Olive B. Sharp, Katherine J. Shaw, G. M. J. Slot, Sonia Straschun, Muriel A. Sutton, Vanda P. Thomas, Ruth C. Townshend, Norah E. Trouton, N. S. B. Vinter, E. C. Whitehall-Cooke.

‡ Awarded a mark of distinction.

M.B. (*Part II.*).—Lena C. Adam, *†¶G. V. W. Anderson, L. S. Banes, Annie H. Banks, M. Baranov, Mary R. Barkas, A. Blackstock, J. D. M. Cardell, W. B. Christopherson, C. E. Cobb, Doris M. Collins, H. C. Cox, R. Coyte, Joyce E. Craggs, Nora A. Crow, T. M. Davies, Mary Day, E. F. Deacon, Elizabeth Denniston, Lilian M. Fisher, G. W. T. H. Fleming, A. Foner, St.G. B. D. Gray, Magdalena A. H. Hamel, A. W. Holgate, H. N. Hornibrook, M. Jackson, V. R. Khanolkar, Muriel E. Landau, Mary K. F. Lander, Alice L. Lloyd-Williams, E. K. Macdonald, Janet McA. McGill, Kathleen McC. McKeown, Gladys Matthews, Vida S. Maxwell, L. M. Moody, Edith M. P. Morris, J. E. Nicole, Marguerite H. Pam, R. J. Perkins, Dorothy P. Priestley, Mary M. Prior, E. F. Rabey, E. D. T. Roberts, H. T. Rymer, E. J. Samuel, S. N. Senitzky, B. B. Sharp, J. H. Sheldon, C. E. A. Shepherd, B. L. Slater, Frances M. Spickett, G. P. Staunton, N. Synn, K. S. Tan, S. R. Tattersall, A. L. Telling, C. J. Thomas, Elsie M. Visick, R. L. Walker, A. D. Wall, A. E. Ward, Eugene Wolff, S. C. Woodhouse.

* Distinguished in Anatomy. † Distinguished in Physiology.
¶ Distinguished in Pharmacology.

UNIVERSITY OF MANCHESTER.

THE following candidates have been approved at the examinations indicated:

FIRST M.B., CH.B.—*Part I, Inorganic Chemistry and Physics:* May Ashburner, Martha F. Barritt, May Blakiston, V. Chadwick, Margaret M. Corbold, J. W. Crawshaw, K. V. Deakin, Dorothy M. L. Dyson, A. M. El Aguizy, Evelyn A. Garnett, Olive M. Gimson, A. Harris, J. Harris, Sylvia K. Hickson, J. H. G. Holt, A. Ingham, H. A. Lomax, A. Maude, W. E. Mitchell, Doris B. Norman, Emily M. Peach, F. L. Pickett, H. Rosenthal, G. Sheehan, Annie E. Sommerhalder, Doris A. Taylor, H. W. Taylor, S. Wand, R. Williamson, J. B. Wright.

Part II, Biology: S. Adler, Martha F. Barritt, V. Chadwick, F. A. van Coller, Phyllis M. Congdon, Margaret M. Corbold, J. W. Crawshaw, K. V. Deakin, Dorothy M. L. Dyson, A. M. El Aguizy, H. P. Fay, F. R. Ferguson, J. B. Fulton, Evelyn A. Garnett, Sylvia K. Hickson, A. Ingham, J. Jacobs, Irma Jehansart, E. Jones, H. A. Lomax, A. Maude, G. L. Meachim, W. E. Mitchell, Doris B. Norman, Emily M. Peach, Annie Rothwell, G. Sheehan, Florence G. Sherry, Annie E. Sommerhalder, Doris A. Taylor, H. W. Taylor, Mary I. Turner, S. Wand, R. Williamson, S. J. Woodall, J. B. Wright.

Chemistry: F. R. Ferguson, J. N. Laing.

Physics: F. A. van Coller, H. D. Preston, Florence G. Sherry, Ethel D. Willis.

Botany: E. L. Morgan, G. L. Taylor.

SECOND M.B., CH.B.—Elizabeth C. Davies, E. Pigott, Marie Wardman, F. L. Whincup. (*Physiology*): J. Yates.

THIRD M.B., CH.B.—A. B. Platt.

D.P.H.—H. Heathcote.

UNIVERSITY OF SHEFFIELD.

THE following candidates have been approved at the examination indicated:

SECOND M.B., CH.B.—*J. N. Gale, J. V. Mainprize, G. E. Rae, J. Ryan, Alice White, Ethel White.

* With distinction in Physiology.

UNIVERSITY OF DURHAM.

THE following were among the degrees and diplomas conferred at the Convocation on March 25th:

M.D. (*for Practitioners of Fifteen Years' Standing*).—H. B. G. Newham, S. A. Sittampalam.

M.B. AND B.S.—A. F. R. Dove, H. K. Graham-Hodgson, E. Haigh, G. Irving, A. E. Raine, A. Smirthwaite, R. Welch.

B.HY. AND D.P.H.—B. G. H. Connolly (*in absentia*), W. Grant.

UNIVERSITY OF ABERDEEN.

WAR SERVICE.

IN the course of his address at the graduation ceremony in the Mitchell Hall, Marischal College, on March 28th, the Principal gave the following statistics as to the number of persons belonging to the university who were serving in the naval and military forces. "Of our administrative teaching and research staffs, which in normal times numbered just over 100, 57 have been or are working directly for the purpose of the war. Of these, 15 are in the combatant service; 17 have commissions in the R.A.M.C. (8 beyond and 9 still within the university); 21 hold military offices of other kinds (6 of these with commissions), one is a prisoner of war, while there are several others who have attested but have not yet been called up. Of our graduates, 890 are commissioned, 253 in the combatant service, 604 in the R.A.M.C., and at least 33 as chaplains; and 161 graduates are still enlisted, making a total of 1,051 graduates on naval and military service. But that number does not include our graduates who are in charge of Red Cross hospitals, of whom 28 have been reported, nor about 30 others entered on the navy list as surgeons and agents at sick quarters. Add these and we have over 1,100 graduates in all on war duties. The exact number of our ungraduated alumni on service cannot be ascertained, but 71 have been reported as holding commissions and 68 as serving in the ranks—in all 139. Of undergraduate students, 121 have been commissioned and 237 have served or are serving in the ranks. Altogether I reckon that about 358 students have entered on service with the colours since the war began; and by the summer term this number will be increased. The total of graduates, alumni, students, staff, and servants of the university on active service is therefore about 1,580, as compared with 1,200 at last graduation. If we add to them the members of our Officers' Training Corps and our graduates who are serving as volunteers or under the Red Cross Society, and at naval sick quarters, we get about 1,700 as a grand total of those on war service or under training. That number does not

include 25 or 30 young men who would have matriculated as students but for their call to arms."

"The Aberdeen University Work Party, organized in the department of materia medica by Professor Cash and a committee of ladies, had been able to dispatch large quantities of surgical dressings and hospital garments to the Red Cross and medical institutions connected with the army."

When the Principal had concluded his address he read out the names of seventy members of the university who had given their lives. Each, he said, had joined the services because the hand of God was upon his conscience in the strength of the most sacred cause to which his country was ever called.

In an earlier part of his address the Principal referred to the postponement of the institution of certain lectureships. This reference recalls the fact that several important benefactions have recently been announced in the departments of medicine and science. These include the foundation by Sir Alexander McRobert, LL.D., of Cawnpore, India, of a lectureship in pathology with special reference to malignant disease. The emoluments of the lectureship will amount to about £750 per annum. The late Mr. William Jackson, Aberdeen, has bequeathed one-half of the residue of his estate towards the establishment of a chair of engineering in the university, the bequest being subject to his widow's life-rent. Mr. George S. Yuill, Australia, has handed over a sum of £4,000 to found travelling and other scholarships in chemistry, with special reference to its practical application to the manufactures and industries of Great Britain. A bequest by the late Miss Anne H. Cruickshank, daughter of a former professor of mathematics in the university, will shortly become operative. Miss Cruickshank left £10,000 for the purpose of founding a chair or lectureship in astronomy, and the revenue from this and other funds available will be sufficient to provide an annual return of £600.

Conferment of Degrees.—The following were among the degrees conferred:

M.D.—A. D. Pringle, M.B. (commended for thesis).

M.B., Ch.B.—*†R. D. Lawrence, M.A., *† A. G. Reid, W. Alexander, J. Anderson, Mary A. Chalmers, A. J. Hawes, A. A. Hearne, S. Henry, Eva C. Ironside, B. S. Kanga, T. S. Law, A. A. Mackenzie, C. W. Macpherson, W. J. Moir, ‡T. O. Robson, A. E. B. Sim, F. Simmers.

* With second-class honours.
† Passed Fourth Professional Examination with "Much Distinction."
‡ Passed Fourth Professional Examination with "Distinction."

Prizes.—The following prizes were presented:

Fife Jamieson memorial gold medal in anatomy: Violet M. G. Smith.

Keith gold medal for systematic and clinical surgery: A. G. Reid.

Shepherd memorial gold medal for systematic and practical surgery: Douglas S. Scott.

Dr. James Anderson gold medal and prize of £5 in clinical medicine: A. G. Reid and T. O. Robson proxime accessit.

Matthews Duncan gold medal in obstetrics: G. R. McRobert.

The Alexander Ogston prize in surgery: F. W. Carter.

UNIVERSITY OF EDINBURGH.

GRADUATION CEREMONY.

IN his address to the new graduates at the graduation ceremony on March 28th, Sir Thomas Fraser, who presided, after a reference to the loss the university had sustained by the death of Sir William Turner, turned to the effect of the war. The number of matriculated students, although materially lessened, had not, he said, been disastrously affected, as appeared to have happened in some of the English universities. In 1913-14 there were 2,731 male students, and in 1914-15 there were 1,941. Comparing the numbers from the beginning of 1914-15 to March 11th, 1915, with those for the same period in 1915-16, the figures were in the former 1,732 and in the latter 1,222. He hoped that in future sessions women would be represented not only in undiminished, but in greater numbers. The number of graduates and students who had already joined the services was about 4,400; of these, 145 had been killed in action or died on service, 126 had been wounded, 2 were missing, and 8 were prisoners. Military honours and decorations had been conferred on 77, and 90 others had been mentioned in dispatches. The training all the alumni had undergone had had a gratifying effect both physically and mentally, and he thought that those great benefits might be continued after the war were physical training regarded as being within the scope of university education. He suggested that a university hall or other building devoted to athletic exercises should be erected, on the walls of which the names of those alumni who had given their lives for the country and empire should be inscribed. The gymnasium he had in view should be under the direction of a scientifically qualified expert with university status able to decide on the appropriate form and extent of the physical training required by each student. Enlightened benefactors of such a movement would place Edinburgh University on an equality of advantage with other Scottish universities, for gymnasia had already been provided, largely by public benefaction, in Glasgow, Aberdeen, St. Andrews, and University College, Dundee.

Conferment of Degrees.—The following degrees were conferred:

M.B., B.S.—K. P. Brownlee, *A. J. Caird, Yun Ying Chan, F. W. Clark, C. T. I. Clarke, A. Cleland, J. A. Crawford, R. C. Crawfurd, H. J. Davidson, J. Dickson, *A. V. Dill, Tha Doe, W. H. Ferguson, G. H. Fraser, Bhaskar Balwantrao Gadgil, J. A. C. Guy, C. Harris, †C. E. Hill, J. M. Johnstone, E. B. Kelley, J. B. P. M'Laron, †J. Manuel, G. Morris, Mathoor Sankara Narayana, †D. H. Paterson, Pierre Ange Rostant, J. J. Shannon, N. H. Smith, D. R. Thomas, A. F. de Waal, Gladys Ward, J. M. Watt, *H. D. Wright.

* With first-class honours † With second-class honours.

UNIVERSITY OF GLASGOW.

THE following candidates for the degrees of M.B. and Ch.B. have passed in the subjects indicated:

[B., botany; Z., zoology; P., physics; C., chemistry; A., anatomy; Ph., physiology; M., materia medica and therapeutics; Path., pathology.] *A. P. Agnew (Z., C.), A. G. Aitken (Z., C.), W. S. Aitken (Z., C.), D. E. Alley (B.), A. A. Bain (Z., C.), A. Baird (Z.), A. Barr (Z.), A. M. Beaton (Z.), A. R. Black (P.), J. T. Blundell (Z.), G. H. Boyd (Z., C.), A. O. Bruce (Z.), G. F. Cables (Z.), S. Caldwell (Z., C.), P. A. Carrie (Z., C.), A. Chisholm (Z., C.), D. H. Clutterbuck (C.), H. Collingbourne (C.), A. B. Cook (B., Z., C.), W. Davie (Z.), J. Dawson (Z., C.), J. Dewar (Z.), A. S. Dick (Z.), J. M. Duff (Z.), W. N. Duguid (Z.), *T. Fletcher (Z., C.), J. C. Forsyth (Z., C.), B. P. Gardner (B., C.), T. Gibson (Z., C.), *R. D. Gillespie (Z., C.), C. Glen (Z., C.), G. G. Graham (C.), A. Gray (Z., C.), *J. L. Halliday (Z., C.), D. R. Hamilton (Z., C.), W. M. Hamilton (P.), D. Henderson (Z., C.) W. C. Holdsworth (Z., C.), W. Houston (Z., C.), A. D. Humble (B., P.), J. Harwich (Z., C.), G. Jamieson (C.), L. M. Johnston (Z., C.), W. L. Kennedy (Z., C.), D. A. Ker (Z., C.), W. P. D. Kerr (Z., C.), J. C. Kirkwood (Z., C.), D. Lamont (Z., C.), J. Lavelle (Z.), A. Logan, M.A. (B.), A. L. M'Adam (Z., C.), G. M'Alpine (B., P., C.), G. H. Macartney (Z., C.), H. J. M'Bride (Z., C.), M. M'N. M'Bride (B., P.), W. M. M'Cash (Z., C.), A. M. M'Clure, (Z., C.), J. M'Court (B.), R. M'Courtney (B.), D. Macdiarmid (Z., C.), J. Macdonald (Z., C.), T. S. MacDonald (Z., C.), J. M'Dougall (Z., C.), J. Macfarlane (Z., C.), T. J. M'Kail (Z., C.), W. M'Kendrick (Z., C.) S. R. M'Kim (B., Z.), O. T. Maclaren (Z., C.), *J. M'Nair (Z., C.), J. C. M'Naught (Z., C.), R. M. Macpherson (Z., C.), M. F. G. Main (Z.), A. Markson (Z., C.), E. E. Miller (Z., C.), J. M. L. Mitchell (Z., C.), *G. W. Murray (Z., C.), J. Nairne (Z., C.), J. P. Neilson (C.), M. Nicolson (Z., C.), G. S. P. Noble (Z.), A. L. Orr (Z., C.), T. C. Porter (C.), A. H. Rankin (Z., C.), P. C. Rankin (P.), J. Reid (Z., C.), J. F. Reilly (Z., C.), C. G. Richards (Z.), J. Sachs (Z., C.), W. H. Scott (Z., C.), H. E. Seiler (Z., C.), H. J. Sheppard (Z., C.), A. G. Smith (Z., C.), D. C. Smith (Z., C.), A. Snaddon (Z., C.), J. Sneddon (C.), F. C. Speechly (C.), A. V. Steen (Z., C.), D. Stewart (Old Ord.) (B.), D. Stewart (Z., C.), *J. M'L. Strang (Z., C.), W. D. Sutherland (Z., C.), A. Symon (Z., C.), A. S. Taylor (Z.), C. N. Tempie (Z.), *W. L. Templeton (Z., C.), J. N. Tennant (Z., C.), D. W. Tobias (Z., C.), G. Tudhope (Z., C.), J. W. Walker (B., P.) J. D. Whiteford (C.), C. E. Whittet (Z., C.), P. A. Wilson (C.), W. Wilson (Z., C.), J. Wingate (Z., C.), *J. Wyllie (Z., C.), *J. Yule (Z., C.), Annie M. Alexander (Z.), Marion B. Armstrong (Z., C.), *Mary Baird (Z., C.), Margaret Bennett (Z., C.), Elizabeth M. V. H. B. Bird (Z., C.), Margaret W. Blackwood (Z., C.), Agnes L. D. Bradford (Z., C.), Susan S. Bryce (C.), Lilias E. B. Buchanan (Z.) Annie B. Cameron (P., C.), Edith Chalmers (C.), Ellen B. Cowan (Z.), Edith M. Davidson (Z.), Simone Denil (Z., C.), Isabella G. Dunlop (B.), *Elsie F. Farquharson (Z., C.), Elizabeth J. Findlay (Z., C.), Christian M. Fleming (Z., C.), Margaret E. Gibson (Z.), Muriel M. Gilmour (Z., C.), Agnes S. Glover (Z., C.), Mabel S. Goudie (B., Z.), Mary B. Grant (Z., C.), Christina Gray (Z., C.), Brünnhilde M. Grieve (Z., C.), Agnes B. Hart (Z.), Marion P. Hogg (B., P.), Isabel E. R. Jeffrey (C.), *Margaret L. Johnston (Z., C.), Jane C. MacDonald (Z., C.), *Mary J. Macfarlane (Z., C.), Annie I. C. Maclardy (C.), *Alexandrena M. Maclennan (Z., C.), Marie J. M'Naught (C.), Muriel M. M'Walter (C.), Janet D. Montgomery (Z., C.), Effie Niblock (Z., C.), Alice J. Paton (B.), Joanna T. Rae (Z., C.), Isobel Reid (Z.), Kathleen E. H. Rutherford (Z., C.), Mary Russell (Z., C.), Marguerite L. Sclanders (Z., C.), Margaret D. L. Service (Z., C.), Catriona Sinclair (Z., P.), Elizabeth H. M. Slimmon (Z., C.), Alexandra W. Smyllie (Z., C.), Jane E. Stewart (Z., P., C.), Christina S. Stoddart (Z., C.), Margaret M. Stuart (Z.), Dorothy M. Summers (Z.), Helen B. Sutherland (Z., C.), Margaret Y. Turnbull (Z.), *Mary C. Walker (Z., C.), Mary L. Wilson (Z., C.), *Helen F. Wingate (Z., C.), Agnes H. M. Young (Z., C.).

C. O. Anderson (A.), A. B. Austin (Path.), R. Bethune (M.), A. Black (M.), D. C. Bowie (Ph., M.), J. Bradford (Path.), *A. D. Brown (A., Ph.), M. J. Cahalane (M.), T. W. Carstairs (Ph.), M. Chalmers (A.), A. E. Cochrane (M.), H. A. Cochrane (M.), A. C. Connell (A., Ph.), E. M. E. Cumming (A., Ph.), W. Dempster (M., Path.), J. C. Dow (A., Ph.), A. B. S. Drysdale (M.), K. H. Dyke (M., Path.), D. Finlayson (M.), J. P. Fleming (M.) T. Fleming (M.), T. Forrest (M.), A. D. Fraser (A.), K. J. A. Gillanders (M.), W. H. Gordon (Path.), A. S. Goudie (M.), P. F. A. Grant (A., Ph., M.), J. S. M'L. Gray (M.), J. G. Harrower (M.), A. Henderson (M.), J. Hislop (M.), T. J. Honeyman (Path.), M. Hyman (M.), E. P. Irving (Path.), J. Irving (M.), J. Joels (M.), R. E. Kerr (M.), W. H. Kerr (M.), W. M. Kerr (M., Path.), J. P. Kilty (M.), A. B. M'A. Lang (Path.), G. Lean (Path.), J. Liddell (M.), J. Lipschitz (M.), F. R. Lubovius (Path.), W. W. Lundie (Path.), *A. J. Macartney (A., Ph.), D. MacColl (A., Ph.), H. E. M'Coll (M., Path.), A. B. Macdonald (A., Path.), R. T. M'Gibbon (M.), A. D. C. M'Gowan (Path.), T. M'Gowan (M.), J. A. C. MacGregor (M.), D. B. M'Intosh, (Path.), J. W. Mackay (M.), D. W. M. MacKenzie (M., Path.), R. H. M'Killop (Path.), J. G. M'Kinna (A., M.), J. M. Mackintosh (Path.) W. S. L. M'Leish (M.), J. Macleod (A., Ph.), W. M'Linden (M.), F. K. Macmillan (A., Ph.), D. Macqueen (M., Path.), A. W. M'Rorie (M.), J. M. Melvin, (M.), G. A. Mitchell (Path.), W. Napier (M.), J. Nicolson (A., Ph., M.), I. L. Oluwole (A.), J. Paterson (A., Ph.), J. W. Patterson (M., Path.), N. B. Peacock (M.), G. Pearson (M.), R. J. Peters (M.), J. B. Potter (M.), R. U. Qureshi (A., Ph.), I. M. Robertson (M.), J. J. Robertson (M.), F. W. Sandeman (M., Path.), T. R. Sinclair (Path.), C. L. Somerville (M.), *T. Stark (A., Ph.), J. Stewart (A., Ph.), A. S. Strachan (M.), J. T. Taylor (A.), J. J. Treanor (M., Path.), J. C. Vaughan (M.), A. R. Waddell (A., Ph.), J. L. Walker (M., Path.), W. A. Walker (A., Ph.), H. D. Wallace (M.), H. Wands (A. Ph.), R. Wiggins, (M.), G. M. Wishart (M.), R. Young (A., Ph.), Annetta G. T. Anderson (Path.), Ellen D. Anderson (A., Ph.), Mabel N. Blake (M., Path.), Grace Chatterton (M.), Margharita M. L. Couper (M.), Grace A. Fleming (M.), Margaret O'R. Gallagher (Path.), Mary B. Gillespie (Path.), Jane E. Hanson (M.), Janet W. Hepburn (M.), Mary R. Knight, M.A. (M.), Elizabeth C. Loudoun (M.), Mary J. Macdonald (M.), Isabella Q. M'Fadzean (M.), Margaret T. M'George (M.), May E. MacIver (Path.), Maud E. D. Mackinnon (A.), Margaret G. M'Vey (M.)

Florence F. M. Milne (A., Ph.), Mercedes M. Morton (Path.), Elizabeth P. Y. Paterson (M.), Vida J. Perry (A., Ph.), Margaret I. Prangnell (A., Ph.), Margaret N. Robertson (Ph.), Agnes P. Routledge (M.), Marjory Mary Scanlan (A., Ph.), Katherine Scott (A., Ph.), Margaret M. C. Steedman (M.), Dorothea H. Suttie (M.), Lydia I. H. Torrance (M.).

The following have passed in Medical Jurisprudence and Public Health of the fourth professional examination (New Medical Ordinance):

J. W. W. Baillie, J. E. Bannen, *W. M. Cameron, R. Cunningham, D. Heard, F. W. Hebblethwaite, G. M. Hetherington, H. F. Hollis, J. R. R. Holms, *J. N. Jamieson, K. M'Alpine. N. MacKillop, *J. M. Mackintosh, H. Robertson, H. B. Sergeant, A. W. Smith, J. T. Wylie, Janetta M. Alexander, Winnifred J. Crawford, Margaret H. Glen, Alice J. Marshall, May I. T. Reid, Marion Watson, *Mary MacL. Weir.

The following have passed in Medical Jurisprudence and Public Health of the third professional examination (Old Medical Ordinance):

A. G. Brand, J. MacD. Clark, W. H. Gordon, E. G. S. Hall, T. J. Honeyman, *A. B. M'A. Lang, A. D. C. M'Gowan, A. B. Stich, J. A. White.

* Passed with distinction in one or more subjects.

Note.—Students under the Old Medical Ordinance who have not previously passed in Pathology will note that a pass at this time in Medical Jurisprudence is conditional on their also undergoing the present examination in Pathology.

UNIVERSITY OF DUBLIN.

THE following candidates have been approved at the examinations indicated:

INTERMEDIATE M.B.—*Part I, Anatomy and Physiology:* A. J. Vorster, R. Rosnekov, C. D. Brink, J. J. G. de Kock, W. R. Burns, Olive G. Blackham, H. B. Van der Merwe, W. B. Briggs, L. Widoger. *Part II, Applied Anatomy and Applied Physiology:* *H. L. Parker, *V. M. Synge, *C. L. Wilson, L. Albertyn, P. B. Molony, R. M. D. Devereux, Mary C. Sheppard, J. C. Fouche, W. L. Young, †W. P. Elford, †W. V. Pellissier W. Sweetnam, E. E. Rollins, †K. Greer, †T. H. R. McKiernan, P. H. S. Smith, T. B. H. Tabuteau, †E. J. Lydon, †W. A. Shannon, P. A. Dormer, L. J. Nugent, W. F. McConnell, T. S. McDonald, J. G. Bird, Ethel M. Luce, E. S. E. Mack, †J. A. W. Cullen, †T. M. Bentley, J. M. Hill, D. McElwee, Olive G. Blackham, J. B. McGranahan, P. J. Swanepoel

* Passed on high marks. † Equal.

FINAL M.B.—*Part I, Materia Medica, Pathology, Medical Jurisprudence, and Hygiene:* *P. Rock, *R. W. Nesbitt, J. R. Brennan, H. Brill, W. J. McClintock, S. V. Furlong, H. Banks, A. A. L. Albertyn, A. I. Steyn, C. P. Chambers, W. P. Lubbe, C. Weir. S. A. Clark, T. E. Hill, F. W. P. Sullivan (Materia Medica and Pathology), Michael C. Dippenaar (Pathology completing examination), Millicent Hamilton-Johnstone (Materia Medica, Medical Jurisprudence, and Hygiene completing examination), H. H. Molloy (Materia Medica completing examination). *Part II, Surgery:* J. W. Bigger, T. Lane, C. L. McDonagh, L. Blumberg, Millicent Hamilton-Johnstone, M. McG. Russell, Eileen G. Gwynn, F. J. Murphy. *Medicine:* J. W. Bigger, R. C. B. Ramsay, G. W. Doran, J. T. Westby, Millicent Hamilton Johnstone, Eileen G. Gwynn, R. Gordon. *Midwifery:* Millicent Hamilton-Johnstone, J. G. Bird, F. Healy, J. T. Westby, S. V. Furlong, H. S. Campion.

D.P.H.—*Part I, Bacteriology, Pathology, Chemistry, Physics, and Meteorology:* B. D. Crichton. *Part II, Sanitary Engineering, Vital Statistics, Public Health, Hygiene, and Epidemiology:* J. R. D. Holtby, Marjorie Chapman, Florence Colquhoun.

* High marks.

QUEEN'S UNIVERSITY OF BELFAST.

THE following degrees and diplomas were conferred at the spring graduation ceremony:

M.D.—S. H. Davison, F. C. Mann.

M.B., B.CH., AND B.A.O.—*Eileen M. Bell, D. Corry, *J. Cullenan, C. F. Davey, S. J. W. Donald, J. E. Finlay, Mary E. Henry, Mary M. Keirns, J. M. McCormack, *J. C. McMillan, Joseph R. M. Mackenzie, J. F. W. Meenan, W. N. Montgomery, R. L. Sinclair.

D.P.H.—†Dr. A. M. Elliott, †Dr. P. J. Gaffikin, Dr. H. M. Jackson, Dr. R. J. Morgan.

* Second-class honours. † In absentia.

THE Association of Infant Welfare and Maternity Centres desires to make it known that it has not authorized the use of its name in connexion with the child life and welfare exhibition to be held in London in June.

THE American Gynecological Society will hold its forty-first annual meeting at Washington on May 9th and the following days. The principal subjects for discussion are syphilis, cancer of the uterus, and painless labour.

THE National Union of Trained Nurses has addressed to the President of the Board of Trade a memorial begging that an inquiry should be instituted regarding the articles and memorandum of association of the proposed college of nursing, on the ground that it would be against the best interests of the nursing profession that the scheme in its entirety and with its present articles should be permitted to proceed. It is asked that the scheme should be examined by a competent body of professional experts, including representatives of the General Medical Council and of the British Medical Association, as well as of societies of trained nurses.

Letters, Notes, and Answers.

THE telegraphic addresses of the BRITISH MEDICAL ASSOCIATION and JOURNAL are: (1) EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London;* telephone, 2631, Gerrard. (2) FINANCIAL SECRETARY AND BUSINESS MANAGER (advertisements, etc.), *Articulate, Westrand, London;* telephone, 2630, Gerrard. (3) MEDICAL SECRETARY, *Medisecra, Westrand, London;* telephone, 2634, Gerrard. The address of the Irish office of the British Medical Association is 16, South Frederick Street, Dublin.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

QUERIES.

INCOME TAX.

PERPLEXED inquires as to the deductions to be made in respect of his motor car.

*** All running expenses, petrol, tyres, repairs, etc., also such recurring expenses as insurance, licences, etc., are deductible as ordinary locomotion expenses. No allowance is due for depreciation, whether caused by wear and tear or otherwise; but the actual net cost of renewal or replacement is admitted to be a proper subject for deduction in calculating the profits for the year in which that expense was actually incurred. In the case put by our correspondent—namely, the sale of a car for £100 owing to depreciation from wear and tear and the purchase for £375 of a new car—£275 would be a correct deduction. It should be borne in mind that the deduction is not to be made *from* the average profit but in arriving at the profits entering into the average.

W. M. M. J. inquires what income tax would be payable on an income made up as follows:

	£	s.	d.
R.A.M.C. pay (gross)	359	16	0
Professional earnings from practice abroad...	85	0	0
Unearned income (net)	122	0	0

*** Assuming that our correspondent would not be residing in this country if he were not in the military service, we think that the £85 will probably be regarded as exempt from taxation. The sum of £122 is presumably the net amount after tax at 3s. in the £ has been deducted, in which case the *gross* amount would be about £143 10s., and our correspondent's gross taxable income would therefore be £360 + £143 = £503. It is unfortunate that this exceeds £500, inasmuch as the lower scale of abatements applies and the higher scale of rates of tax. The unearned income being taxed, the only tax payable direct is on the pay, namely, £360 less £100 (= £260) at 1s. 9¾d., that is, £23 8s.

LETTERS, NOTES, ETC.

"METRIC PRESCRIBING."

DR. W. W. HARDWICKE (London, S.W.) writes: In my letter in the issue of April 1st, the sign for "centimilligram," *cmg.*, was, by an error of the printer, converted into "cubic milligram" by the insertion of a stop after the *c*. The metric equivalent for 1 grain, shown as 0.65, should have been .065. I regret that, when correcting the proof, the errors escaped my notice.

SALVARSAN.

MR. JOHN WEBSTER, F.I.C. (St. Mary's Hospital, W.), writes: In the paper contributed to the BRITISH MEDICAL JOURNAL of April 1st by Dr. Willcox and myself, the formula of salvarsan has by an oversight been given as $C_{12}H_{12}O_2N_2As_2(HCl)_2$, instead of

$$C_{12}H_{12}O_2N_2As_2(HCl)_2 + 2\,H_2O.$$

This latter formula gives an arsenic content of 31.6 per cent. (= As_2O_3 41.7 per cent.), and not 34 per cent. (= As_2O_5 44.9 per cent.) as stated in the paper.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

	£	s.	d.
Seven lines and under	0	5	0
Each additional line	0	0	8
A whole column	3	10	0
A page	10	0	0

An average line contains six words.

All remittances by Post Office Orders must be made payable to the British Medical Association at the General Post Office, London. No responsibility will be accepted for any such remittance not so safeguarded.

Advertisements should be delivered, addressed to the Manager, 429, Strand, London, not later than the first post on Wednesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.